DOE–LM/GJ1103–2006

Pinellas Environmental Restoration Project

Sitewide Environmental Monitoring Quarterly Progress Report for the Young - Rainey STAR Center October Through December 2005

January 2006

U.S. Department of Energy

Office of Legacy Management

Work Performed Under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management.

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Acronyms and Abbreviations

bls	below land surface
°C	degrees Celsius
CMS	Corrective Measures Study
CMIP	Corrective Measures Implementation Plan
COPC	contaminants of potential concern
CRDL	contract required detection limit
DCE	dichloroethene
DOE	U.S. Department of Energy
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FONSI	Finding of No Significant Impacts
ft	feet
ft/ft	feet per foot
gpm	gallons per minute
HSWA	Hazardous and Solid Waste Amendment
HRC	Hydrogen Release Compound®
ICM	interim corrective measures
IDL	instrument detection limit
IMW	Interim Measures Work (Plan)
IWNF	Industrial Wastewater Neutralization Facility
MCL	maximum contaminant level
MSL	mean sea level
µmhos/cm	micromhos per centimeter
µg/L	micrograms per liter
mg/L	milligrams per liter
mV	millivolt
NAPL	non-aqueous phase liquid
NEPA	National Environmental Policy Act
NGVD	national geodetic vertical datum
NTU	Nephelometric Turbidity Units
PCIC	Pinellas County Industrial Council
QA/QC	quality assurance/quality control
RBCA	Risk Based Corrective Action
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RPD	relative percent difference
STAR Center	Young - Rainey Science, Technology, and Research Center
SWMU	solid-waste management unit
TCE	trichloroethene
TCOPC	total contaminants of potential concern
VOCs	volatile organic compounds
WWNA	Wastewater Neutralization Area

1.0 Introduction

The Young - Rainey Science, Technology, and Research Center (STAR Center) is a former U.S. Department of Energy (DOE) facility constructed in the mid-1950s in Pinellas County, Florida. The 99-acre STAR Center is located in Largo, Florida, and lies in the northeast quarter of Section 13, Township 30 South, Range 15 East (Figure 1). The STAR Center, while owned by DOE, primarily manufactured neutron generators for nuclear weapons. Other products manufactured at the STAR Center have included radioisotopically powered thermoelectric generators, thermal batteries, specialty capacitors, crystal resonators, neutron detectors, lightning-arrestor connectors, and vacuum-switch tubes. In 1987, the U.S. Environmental Protection Agency (EPA) performed a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) (EPA 1988) at the site to gather information on potential releases of hazardous materials. In February of 1990, EPA issued a Hazardous and Solid Waste Amendment (HSWA) permit to DOE, enabling DOE to investigate and perform remediation activities in those areas contaminated by hazardous materials resulting from DOE operations. On March 17, 1995, DOE sold the facility to the Pinellas County Industrial Council (PCIC). The sales contract included clauses to ensure continued compliance with Federal, State, and local regulations while DOE remediates the site. On July 1, 1999, the PCIC was disestablished and ownership of the STAR Center changed to the Pinellas County government. In November 2000, the State of Florida received HSWA authorization from the EPA. The Florida Department of Environmental Protection (FDEP) issued a new HSWA permit to DOE in January 2002.

Administration of DOE activities at the facility is the responsibility of the DOE Office of Legacy Management in Grand Junction, Colorado. S.M. Stoller Corporation (Stoller), a prime contractor to DOE's Office of Legacy Management in Grand Junction, provides technical support to DOE for remediation and closure of all active solid-waste management units (SWMUs) on site.

The EPA RFA Report and the HSWA permit identified 15 sites at the former DOE facility that may have experienced environmental contamination as a result of past activities. Upon completion of the RCRA Facility Investigation (DOE 1991), 11 of the 15 SWMUs were recommended by DOE and approved by EPA Region IV and the FDEP for no further action (DOE 1994). A twelfth site, the Former Pistol Range Site, was remediated in 1993 and recommended by DOE and approved by EPA Region IV and the FDEP for no further action.

Two additional SWMUs, the West Fenceline Site and the Wastewater Neutralization Area/ Building 200 (WWNA/Building 200), were identified after the HSWA permit was issued, bringing the total to 17 SWMUs that have been identified and investigated at the STAR Center. Remediation of the West Fenceline Site was completed in 1997 and DOE recommended, and EPA Region IV and FDEP approved, no further action. A Corrective Measures Study (CMS)/Corrective Measures Implementation Plan (CMIP) was prepared and submitted in 1997 to EPA Region IV and FDEP to address the contamination at the WWNA/Building 200 Area.

Therefore, there are currently four sites that have contamination in the surficial aquifer ground water at levels in excess of protective standards. These four SWMUs, the Old Drum Storage Site (PIN06), the Industrial Drain Leaks-Building 100 Area (PIN12), the Northeast Site (PIN15), and the WWNA/Building 200 Area (PIN18), are undergoing remediation activities. Two SWMUs, PIN06 and PIN12, are currently being remediated together because of their similar ground water contamination and proximity. These two SWMUs are collectively known as the Building 100

Area. Figure 2 depicts the location of the four SWMUs. Additional background information relative to each SWMU is briefly described below.

This document also serves as the quarterly progress report for each of these four SWMUs. The results of monitoring activities, a summary of the treatment system performance, and a summary of ongoing and projected work are provided in this report.

1.1 Building 100 Area

The Building 100 Area (PIN06 and PIN12) is located in the southeast portion of the STAR Center. The Old Drum Storage Site is the former location of a concrete storage pad equipped with a drain and containment system used to store hazardous waste including dichloromethane (also known as methylene chloride), ignitable liquids, arsenic, and calcium chromate solids (DOE 1987a). Empty drums containing residual waste solvents were also stored in this area (DOE 1987b). The concrete pad was located near the northwest corner of Building 100. The pad was removed in October 1983 in accordance with an FDEP closure permit (DOE 1987a), and a closure report was submitted to the FDEP in August 1986 (DOE 1986). The decommissioning of the pad and the cessation of drum storage effectively removed the potential for a future contaminant source at PIN06.

Building 100 is the largest building at the STAR Center and covers approximately 11 acres. In the past, offices, laboratories, and production facilities for the DOE were housed in the building. SWMU PIN12 consists of the liquid waste drainage system that formerly served Building 100. Four individual drainage systems (sanitary, chemical, health physics, and storm water) were present within the building. In 1989, all four drainage systems were investigated, including verifying the system routing and the condition of underground and above-ground piping and ancillary equipment (EMC 1989). As a result of this investigation, the health physics and chemical drainage systems were flushed, grouted, and abandoned (DOE 1997). Some of the chemical drain lines were replaced by an above-ground system currently used by tenants of the building.

A CMS and CMIP were completed and approved for the Building 100 Area because volatile organic compounds (VOCs) concentrations measured in ground water at the Old Drum Storage Site (PIN06) and one monitoring well located at the northwest corner of Building 100 (PIN12) exceeded the Safe Drinking Water Act and FDEP maximum contaminant levels (MCLs). Subsequent investigations revealed elevated VOCs concentrations under Building 100 and downgradient to the southeast as well. On August 15, 2000, EPA approved the Building 100 CMIP Addendum. FDEP approved this same document on November 15, 1999.

In May 2001, DOE began an analysis of the potential remediation strategies for the three Building 100 Area tasks: plume control, source treatment, and dissolved phase treatment. The *Building 100 Area Remediation Technology Screening Report* (DOE 2001) assembled a list of remediation technologies, categorized them into the remediation tasks, and conducted an initial screening of the technologies. This initial screening eliminated the technologies that obviously would not work and recommended technologies that should be retained for detailed evaluation at a later time. The final technology for each task will be identified at a later date.

The *Building 100 Area Plume Control Technology Selection Report*, prepared in February 2002, conducted a detailed evaluation of five plume control technologies and recommended that enhanced bioremediation should be implemented for plume control at the Building 100 Area.

In-situ enhanced bioremediation to control the plume of dissolved contaminants at the Building 100 Area began as a pilot study on March 11, 2003. Hydrogen Release Compound® (HRC) was injected through nine injection points surrounding each of three monitoring wells. Ground water samples were collected from each of the three monitoring wells at approximately 2-month intervals through May 2004 to track the progress of HRC at remediating site contaminants. HRC was selected because it is an effective technology for optimizing degradation rates of chlorinated hydrocarbons dissolved in ground water. The continuous hydrogen source provided by the HRC can reduce the concentration of dissolved phase chlorinated hydrocarbons by greatly enhancing the reductive declorination process that occurs naturally at the Building 100 Area. The *In-Situ Enhanced Bioremediation Technology to Control the Plume of Dissolved Contaminants at the Building 100 Area of the Young - Rainey STAR Center Pilot Test* final report was received from the subcontractor on April 5, 2004. The results of the pilot test indicate that the injection of HRC had a limited influence in the pilot test area. This conclusion is based on increasing concentrations of the metabolic acids (as produced from HRC) and the decreasing concentrations of sulfate and iron and the observation of ethene at one location. A supplemental sampling event was conducted in May 2004, after which the pilot test was considered complete.

1.2 Northeast Site

In the late 1960s, before construction of the East Pond, drums of waste and construction debris were disposed of in the swampy area of the Northeast Site. The East Pond was excavated in 1968 as a borrow pit. In 1986, an expansion of the East Pond was initiated to create additional storm-water retention capacity. Excavation activities ceased when contamination was detected directly west of the East Pond. EPA identified the Northeast Site as a SWMU (EPA 1992). An Interim Corrective Measures (ICM) Study was developed and submitted to EPA and approval of this document was received in October 1991. An interim ground water recovery system for the Northeast Site was installed, and operation commenced in January 1992.

The ground water treatment system, as initially installed, consisted of four recovery wells equipped with pneumatic recovery pumps, a holding tank, centrifugal transfer pumps, and approximately 2,500 feet (ft) of transfer and secondary containment piping. During 1993, DOE proposed a reconfigured system for the site consisting of four shallow and three deep recovery wells. After EPA approved the upgrade, the system was reconfigured and became operational on March 1, 1994.

Between August and October 1995, after EPA and FDEP approval, a portion of the Northeast Site was excavated to remove debris and other materials that could inhibit future corrective measures. Location of the areas of excavation was based primarily on the results of a geophysical survey and knowledge of existing utility locations. Detailed descriptions of the debris removal activities were submitted to EPA and FDEP as part of the *Northeast Site Interim Measures Quarterly Progress Report* (DOE 1996).

In 1996, DOE submitted a CMIP to EPA Region IV and FDEP. This plan was approved by both regulatory agencies in 1997. As part of the Northeast Site CMS and CMIP, a pump-and-treat

system in conjunction with a subsurface hydrogeologic barrier wall to prevent migration of the contaminant plume was identified as the best available technology. A pretreatment system for iron removal, an air stripper unit, and a tank for holding treated ground water before discharge to the Pinellas County Publicly Owned Treatment Works were recommended. The treatment system was constructed in early 1997 and became operational by July 1997 with seven Northeast Site recovery wells and two Building 100 recovery wells pumping to the system influent tank. Subsequently several additional recovery wells were installed, and some of the old recovery wells were abandoned.

During 1997, anaerobic bioremediation and rotary steam stripping pilot tests were conducted in the northern and southern portions of the Northeast Site, respectively. These tests were designed by an Innovative Treatment Remediation Demonstration group of regulatory and industry members to provide remedial options at the STAR Center. At the conclusion of the field tests in July 1997, pump-and-treat technology resumed at the Northeast Site.

An *Interim Measures Work* (IMW) *Plan for Remediation of Non-Aqueous Phase Liquids at the Northeast Site* was submitted to FDEP in late November 2001. The purpose of this document was to present the plan for the interim measure to remediate non-aqueous phase liquids (NAPLs) at the Northeast Site. An ICM is warranted because it supports the long-term corrective action to remediate the dissolved phase contamination in the surficial aquifer to FDEP drinking water MCLs. Without this measure, NAPLs will continue to act as a source of dissolved contamination, resulting in contaminant concentrations in ground water well above the MCLs. FDEP approved this document on January 10, 2002.

Concurrent with the preparation of the IMW Plan, a National Environmental Policy Act (NEPA) Environmental Checklist recommending a Categorical Exclusion was approved by DOE on December 19, 2001. Categorically excluding the Area A pilot test activity was approved based upon the fact that the NAPL remediation of Area A was a small-scale, short-term cleanup action and the siting, construction, and operation of treatment facilities were temporary and pilot-scale in size. Additionally, activities of this nature were evaluated in the 1995 *Environmental Assessment of Corrective Action at the Northeast Site* (EA) (DOE 1995).

A NEPA Action Review was conducted for the interim measure source removal action at Area B in October of 2002. A summary of the review concluded that Area B remediation would impact an area of approximately 38,000 square ft. The footprint of the above ground treatment system would be about 80 ft by 80 ft, and an estimated 84,000 gallons per day of ground water would be processed over a 24-week period of operation. The proposed interim measure, although not specifically identified in the 1995 EA, was determined to be within the scope of the proposed actions. The remedial activity would occur within the same physical boundaries and address the same contaminants identified in the EA, but in a more concentrated form. Because the EA provided for “design modifications to reflect technological advances or site-specific conditions,” it was determined that the NAPL remediation of Area B was within the scope of the existing EA. However, this flexibility was not mentioned in the Finding of No Significant Impacts (FONSI) document signed in May 1995 (Glass 1995). Therefore, it was determined that the appropriate action under NEPA would require an amendment to the FONSI to include the broader scope of activities from the EA and any additional impacts from the NAPL removal action. The FONSI was amended, reviewed by the DOE-Idaho NEPA Planning Board, and approved by the DOE Grand Junction Office NEPA Compliance Officer on February 24, 2003.

Construction of the NAPL Area A treatment system began in late May 2002, and system startup occurred on September 26, 2002. NAPL treatment was completed on February 28, 2003. Three post-treatment sampling events occurred in March, May, and August 2003. Demobilization activities began in early March and were completed in September 2003. The *Northeast Site Area A NAPL Remediation Final Report* (DOE 2003), describing thermal remediation of Area A, was sent to stakeholders on September 25, 2003.

At the end of February 2004, a contract was awarded for the remediation of NAPL Area B using Electro-Thermal Dynamic Stripping Process. Construction of the NAPL Area B treatment system began in July 2004, and was completed in early August 2005. Operations began on August 16, 2005. Significant events associated with NAPL remediation during this reporting period are presented in the *Northeast Site Non-Aqueous Phase Liquids Interim Measures Progress Report October through December 2005* (DOE 2006).

1.3 WWNA/Building 200 Area

The WWNA/Building 200 Area includes the active Industrial Wastewater Neutralization Facility (IWNF), the area around Building 200, and the area south of the neutralization facility. The IWNF refers to the physical treatment facility that currently receives sanitary and industrial wastewater and has been in operation since 1957.

A CMS Report and CMIP were completed in 1997 for this SWMU because vinyl chloride, trichloroethene (TCE), and arsenic were detected in surficial aquifer ground water at concentrations above Federal and State MCLs. The recommended remediation alternative for the WWNA/Building 200 Area was ground water recovery with the Building 100 Area wells and an additional recovery well located in the WWNA. The CMIP recommended that recovered water from the additional well be discharged directly to the IWNF and that the recovery well in the WWNA/Building 200 Area will withdraw surficial aquifer ground water directly from the arsenic plume and thereby reduce the contaminant mass and prevent contaminant migration.

FDEP response to the CMS/CMIP concerning arsenic contamination in the upper 2 ft of soil suggested that a treatment technology, air sparging, was eliminated too early. DOE then proposed a multi-phased Interim Action that included operating the recovery well for 6 months, then pulsing the system, as well as performing geochemical analyses and leaching studies of the site. On January 21, 1999, FDEP approved the proposed interim remedial action.

Additionally, EPA Region IV also approved the interim remedial action and concurred with the FDEP's position regarding the arsenic contamination. EPA also requested an addendum or modification to the CMIP that addresses DOE's final selection of the remediation technology and a timeline for the completion of these activities.

In early June 1999, the WWNA recovery well commenced operation. All arsenic concentrations in water from the WWNA recovery well, PIN18−RW01, were below the STAR Center's daily maximum discharge standard for arsenic in wastewater of 0.20 milligrams per liter (mg/L) until shutdown.

Additional details concerning the impacts of ground water extraction are reported in the WWNA/Building 200 Area CMIP Addendum (DOE 2000b). Modifications to the recovery of ground water were proposed based on data collected through November 1999 and consisted of the installation of two new recovery wells screened at shallow intervals and the abandonment of RW01. The CMIP Addendum was submitted to the regulators and approved by FDEP and EPA in 2000. A Statement of Basis (DOE 2000a) was issued by DOE in late September 2000. This document provides a summary of environmental investigations and proposed cleanup alternatives for the WWNA/Building 200 Area. In 2003, monitoring well PIN18−0501 was converted to a recovery well. Current activities through late December 2005 at the WWNA include ground water extraction from three recovery wells, PIN18−RW02, −RW03, and −RW0501, that discharge to the STAR Center's wastewater system. Table 1 lists the results of the analysis of arsenic in ground water that is being recovered from these three wells.

1.4 Site Update

Risk Based Corrective Action (RBCA) legislation is currently being evaluated for applicability to assist in expediting closure at some or all of the SWMUs at the STAR Center. Technical discussions between FDEP and DOE regarding RBCA as the proposed final action continued. Part of DOE's proposed final action for the WWNA was to shut down the three extraction wells and begin a 2-year monitoring period. Verbal approval from FDEP to shut down the WWNA extraction well system was received on December 20, 2005, thus commencing DOE's 2-year monitoring period.

1.5 Waste Minimization and Pollution Prevention

Based on the Federal Pollution Prevention Act and requirements in the HSWA Operations Permit, waste minimization efforts at the STAR Center are documented and reported annually. For 2005, several significant waste minimization and pollution prevention activities were successful. The majority of these activities resulted from the removal of a large concrete slab that provided a foundation to a ground water treatment system at the 4.5 Acre Site, and the construction of the Area B DNAPL treatment system, and includes the following materials that were recycled:

- Corrugated cardboard—about 100 boxes or 400 pounds of cardboard,
- Sixteen empty plastic 55-gallon drums totaling about 400 pounds,
- Seventy-five wooden pallets (3,000 pounds), and
- One hundred twenty-two metric tons of concrete.

1.6 Quarterly Site Activities

- Obtained water-level measurements from all accessible monitoring wells, recovery wells, and ponds on October 14, 2005.
- Conducted the semi-annual sampling event in October 2005. The sampling event included collecting water samples from 43 monitoring and recovery wells. VOCs samples were collected at 22 wells and arsenic was sampled at 23 wells.
- Reported the results of the semi-annual sampling events (this document).
- Bioremediation parameters were collected at 10 wells.

2.0 Water-Level Elevations

2.1 Work Conducted and Methods

Within an 8-hour period on October 14, 2005, depth-to-water measurements were taken at all accessible monitoring wells and extraction wells at the STAR Center. The water levels were measured with an electronic water-level indicator. Ground water and surface-water elevations are listed in Table 2.

2.2 Ground Water Flow

Ground water and surface-water elevations were used to construct sitewide ground water contour maps of the shallow and deep surficial aquifers (Plates 1 and 2, respectively). Individual contour maps were also constructed for the shallow and deep surficial aquifers at the Northeast Site and the Building 100 Area (Figure 3 through Figure 6, respectively).

The water levels throughout the STAR Center indicate that the water table is highest in the general area around the West Pond (Plates 1 and 2). As ground water flows from this recharge area, it disperses to the west, south, and east. These flow patterns are similar for both the shallow and deep surficial aquifers, and are consistent with previously observed flow patterns.

At the Northeast Site, a new flow pattern was observed in October 2005. As can be seen in Plates 1 and 2, a large ground water capture zone has been developed around Area B. Ground water is flowing toward this area from all directions in response to the extraction occurring as part of the Area B NAPL project. Ground water extraction in Area B is expected to continue until March 2006. Along the northern boundary of the Northeast Site, the contours near the slurry wall for the past several years have indicated that the wall has been a significant barrier to ground water flow. This pattern was observed again in October 2005. As seen on Figure 4, in October there was a differential of about 1.8 ft between the downgradient and upgradient sides of the wall as measured in monitoring wells PIN15−M24D and −M33D, respectively. This differential is slightly less than the historical range of about 2 to 5 ft. Water-table elevations indicate that the East Pond was recharging the shallow surficial aquifer in October 2005 (Figure 3).

In the shallow surficial aquifer at the Northeast Site, the hydraulic gradient ranged from approximately 0.015 to 0.021 feet per foot (ft/ft), with flow toward the area of ground water

extraction in Area B (Plate 1). Using Darcy's Law, along with approximations of 1 ft/day for hydraulic conductivity and 0.3 for effective porosity, ground water at the Northeast Site is estimated to move about 18 to 26 ft/year. This velocity is consistent with historical estimates of 17 and 22 ft/year. Similar flow patterns were observed in the deep surficial aquifer (Plate 2).

In the south-central part of the STAR Center, surficial aquifer flow is influenced by ground water withdrawals from recovery wells PIN18−RW02, −RW03, and –RW0501 at the WWNA, and recovery wells PIN12−RW01 and –RW02 at Building 100, and the resulting capture zones can be seen in Figures 5 and 6. For the past 3 years, shallow ground water beneath Building 100 has been observed to flow to the southeast under a very slight gradient. This flow pattern was observed again in October 2005. The hydraulic gradient at the Building 100 Area was about 0.001 ft/ft. Using the approximations mentioned above, ground water flow velocity in this area is estimated to be less than 2 ft/year. Shallow ground water at the WWNA flows to the southeast, except where affected by recovery well withdrawals.

Water-level elevations in the three wells screened in the upper part of the Floridan aquifer are presented in Table 3. The water levels in these wells indicate that the potentiometric surface of the Floridan aquifer at the site was about 1.7 ft lower in October 2005 than in July 2005.

A downward vertical hydraulic differential of approximately 7.7 ft existed between the surficial aquifer wells and Floridan aquifer wells at the Northeast Site. Table 4 illustrates the vertical hydraulic differential. This differential is the same as that observed in July 2005 and is consistent with the historical range of 5 to 9 ft.

Surface-water elevations were recorded from the East, South, and Southwest Ponds at the site and are presented in Table 5. A surface water elevation for the West Pond could not be read because construction activities damaged the staff gauge in the West Pond. It is expected that a new staff gauge will be installed in early 2006. The ponds are hydraulically connected to the shallow surficial aquifer system (Plate 1). The South and Southwest Ponds elevations have always been essentially the same.

3.0 Ground Water Sampling and Analytical Results

3.1 Work Performed

During semi-annual sampling in October 2005, ground water samples were collected from 43 monitoring and recovery wells. VOCs analyses were performed on 23 samples using EPA SW-846 Method 8260. Arsenic was analyzed in 22 samples using EPA SW-846 Method 6010. Laboratory reports are provided in Appendix A.

During the period of October 1 to December 31, 2005, VOCs, iron, and hardness (as $CaCO_3$) were measured for the Building 100 treatment system and results are provided in Appendix B. Laboratory reports for the three recovery wells and the two effluent samples from the WWNA are provided in Appendix C.

Samples were also collected for dissolved gases and microbial activity analyses. The dissolved gases are ethene, ethane, hydrogen, methane, and carbon dioxide. The microbiological analysis is

for dehalococcoides ethenogenes. Analytical results for these gases and this microorganism are summarized in Table 6.

All samples were collected in accordance with the Stoller *Sampling Procedures for the Young - Rainey STAR Center and 4.5 Acre Site* (DOE 2004), using FDEP procedures. All samples collected were submitted to Accutest Laboratories in Orlando, Florida, for analysis. Accutest is accredited by the Florida Department of Health in accordance with the National Environmental Laboratory Accreditation Conference, certification number E83510. All monitoring wells were micropurged using a dedicated bladder pump, and sampling was performed when the field measurements stabilized.. Extraction wells were sampled using their associated flowlines with dedicated sampling ports. Table 7 lists field measurements of pH, specific conductance, dissolved oxygen, oxidation-reduction potential, turbidity, and temperature recorded at the time the samples were collected. Measurements were made with a flow cell and a multiparameter instrument.

3.2 Analytical Results

3.2.1 Northeast Site (PIN15)

Table 8 shows the results of arsenic sampling at four Northeast Site wells. Arsenic concentrations ranged from nondetect to 0.0233 mg/L in PIN15−M14S.

Concentrations of contaminants of potential concern (COPCs) in samples collected from wells at the Northeast Site (PIN15) are included in Table 9, which also shows the previous four quarters of data for comparison purposes. Figure 7 shows the total COPCs (TCOPCs) concentrations.

No COPCs were detected in the four monitoring wells listed below:

PIN15−0561	PIN15−0562	PIN15−0564	PIN15−0565

The 11 monitoring wells listed below contained detectable COPCs:

PIN15−0560	PIN15−0566	PIN15−0569	PIN15−0574	PIN15−0576
PIN15−0563	PIN15−0567	PIN15−0573	PIN15−0575	PIN15−0577
				PIN15−0578

TCOPCs concentrations ranged from below detection limit to 23.1 micrograms per liter (µg/L) in PIN15−0574. The COPC compound detected at the highest concentration was cis-1,2-DCE at 13.5 µg/L.

3.2.2 Building 100 Area (PIN06, PIN09, PIN10, PIN12, and PIN21)

Table 7 shows the results of arsenic sampling in the Building 100 Area. Arsenic values ranged from nondetect to 0.0569 mg/L in PIN12−S68B.

TCOPCs concentrations in samples collected from the seven wells sampled at the Building 100 Area are included in Table 10, which also shows the previous four quarters of data for comparison purposes. Figure 8 shows the TCOPCs concentrations.. All seven wells sampled contained detectable COPCs. The wells are:

PIN12−0514	PIN12−0526	PIN12−RW02	PIN12−S73C
PIN12−0524	PIN12−RW01	PIN12−S35B	

TCOPCs concentrations ranged from 4.8 to 57,956 µg/L. The COPC compound detected at the highest concentration was cis-1,2-DCE at 33,700 µg/L in PIN12−S35B.

3.2.3 Wastewater Neutralization Area (PIN18)

The volatile COPC at the WWNA is vinyl chloride. No VOC sampling was performed at the WWNA during this quarter.

Arsenic samples were collected from seven monitoring wells and three recovery wells. Results of arsenic samples from the three recovery wells that are sampled monthly are presented in Table 1. Concentrations of COPCs from quarterly sampling are listed in Table 11 and TCOPCs (arsenic and vinyl chloride) are shown in Figure 9.

No arsenic was detected in the three wells listed below.

PIN18–0521	PIN18−0523	PIN18−0524

The seven monitoring and recovery wells listed below had detectable arsenic concentrations.

PIN18–0500	PIN18−0522	PIN18–RW02	PIN18–RW0501
PIN18–0502	PIN18–0525	PIN18–RW03	

The highest concentration of arsenic detected was 344 µg/L in PIN18−RW0501 (note that the units for arsenic are converted from mg/L to µg/L so that TCOPCs for this area could be calculated using consistent units).

3.3 Quality Assurance/Quality Control

The analytical results from the analytical laboratory, Accutest, were checked for quality assurance/quality control (QA/QC) through duplicate samples and trip blanks. Detected analytes (VOCs and arsenic) for each duplicate sample are listed in Table 12. The duplicate sample results were compared and the relative percent differences (RPDs) between the results were calculated. Three duplicates were analyzed for VOCs, and three for arsenic.

A total of 111 duplicate analyses for individual analytes were performed. All data passed QA/QC criteria at a Class A level, indicating that the data may be used for quantitative and qualitative purposes.

Duplicate samples should be collected at a frequency of one duplicate for every 20 or fewer samples. There were 22 ground water samples analyzed for VOCs, with three duplicate VOC

samples collected. There were 23 ground water samples analyzed for arsenic, with three duplicate samples. The duplicate requirements for this sampling event were met.

There were 15 trip blanks collected during this event and all were nondetect for volatile compounds.

A data validation software module for identifying and tracking anomalous ground water data points within the SeePRO database was used to print a report of analytical results that fall outside of historical minimum or maximum values.

Anomalous results identified during previous events include location PIN12−S73B, which has been tracked since April 2004 because toluene was detected where it had not previously been present. After follow-up evaluation it was determined that this value should be considered valid since subsequently there have been two positive low level results as well as several estimated values of toluene detected in recent sampling events.

During the July 2005 event, one well, PIN15−0566 showed an anomalous level of TCE of 160 µg/L. Previous levels of TCE seen in this well have been at, or near the detection limit. TCE concentrations will continue to be tracked at this well.

During the October 2005 event several wells showed anomalous field parameter values. Well PIN12−0526 had a dissolved oxygen value of 7.62 mg/L. Because this well failed to meet stability criteria for dissolved oxygen and for temperature, the dissolved oxygen value will be flagged "R" as unusable. Other suspect values for oxidation reduction potential were seen at wells PIN12−S31B. –S32B, −S35B, PIN15−0569, −0573, and –0574. Follow-up tracking of these wells during subsequent sampling events will be used to determine whether or not the data should be qualified.

4.0 Treatment System and Recovery Well Performance

4.1 Building 100

From October 1 through December 31, 2005, 471,778 gallons of ground water were processed by the Building 100 treatment system from the Building 100 Area recovery wells. For the month of October, 150,639 gallons of ground water were recovered and 2.8 pounds of VOCs were removed. In November, 162,089 gallons of ground water were recovered and 3.1 pounds of VOCs were removed. For December, 159,050 gallons of ground water were recovered and 4.74 pounds of VOCs were removed. Operations for this quarter were interrupted twice; once due to a power outage at the Building 100 recovery wells in late October and once due to heavy rainfall in mid-December.

Figure 10 presents the historical monthly volume of ground water recovered and mass of VOCs removed. Analytical results of samples collected from the Building 100 Area treatment system influent and effluent streams are listed in Table 13.

Since startup of the Building 100 treatment system, a summary of ground water recovery volume from the Building 100 Area recovery wells is shown in Table 14. Table 15 presents the

calculated mass of selected analytes recovered with the Building 100 Area treatment system for each month of this reporting period. These monthly results are based on the influent ground water concentration and flow.

4.2 Wastewater Neutralization Area

Two WWNA recovery wells (PIN18−RW02 and −RW03) are targeted to each produce approximately 2.5 gallons per minute (gpm) continuously with an electrical submersible pump set in each well at approximately 12 ft below land surface (bls). The third recovery well, PIN18−RW0501 is operating at approximately 0.8 gpm with a submersible electric pump installed at 15 ft below top of casing. Ground water recovery from PIN18−RW0501 was started on June 11, 2003. The effluent ground water from each well is combined into a common header pipe and discharged into the industrial wastewater-receiving tank at the IWNF.

The three recovery wells at the WWNA operated from October 1 through December 20; the wells were shut off December 20 as discussed in Section 1.4. During this period, 432,703 gallons of ground water were recovered from the subsurface. For the month of October, 174,394 gallons of ground water and 0.08 pounds of arsenic were removed. In November, 159,641 gallons of ground water and 0.05 pounds of arsenic were removed. In December, 98,668 gallons of ground water and 0.03 pounds of arsenic were removed. Figure 11 presents the monthly ground water and arsenic mass recovery since the start of WWNA operations. To date, there have been no exceedances of the WWNA discharge permit limits for arsenic.

5.0 Conclusions

The following conclusions are based on the quarterly sampling conducted in July.

- The surficial ground water flow rate and flow direction throughout the site were similar to those observed previously.
- The highest concentration of COPCs was detected at the Building 100 Area in well PIN12−S35B.

6.0 Tasks to be Performed Semi-Annually

The following tasks are expected to be conducted during the next semi-annual period (October 2005 through March 2006):

- Semi-annual sampling and analysis of ground water in March 2006.
- Collect water level measurements in January 2006 and March 2006.
- Shutdown of the WWNA extraction well system such that it can be restarted with minimal effort.
- Monthly sampling and analysis of the Building 100 treatment system will continue in order to provide compliance and system operations data.
- Utilization of the dedicated bladder pumps for semi-annual sampling using the micropurging technique will continue.

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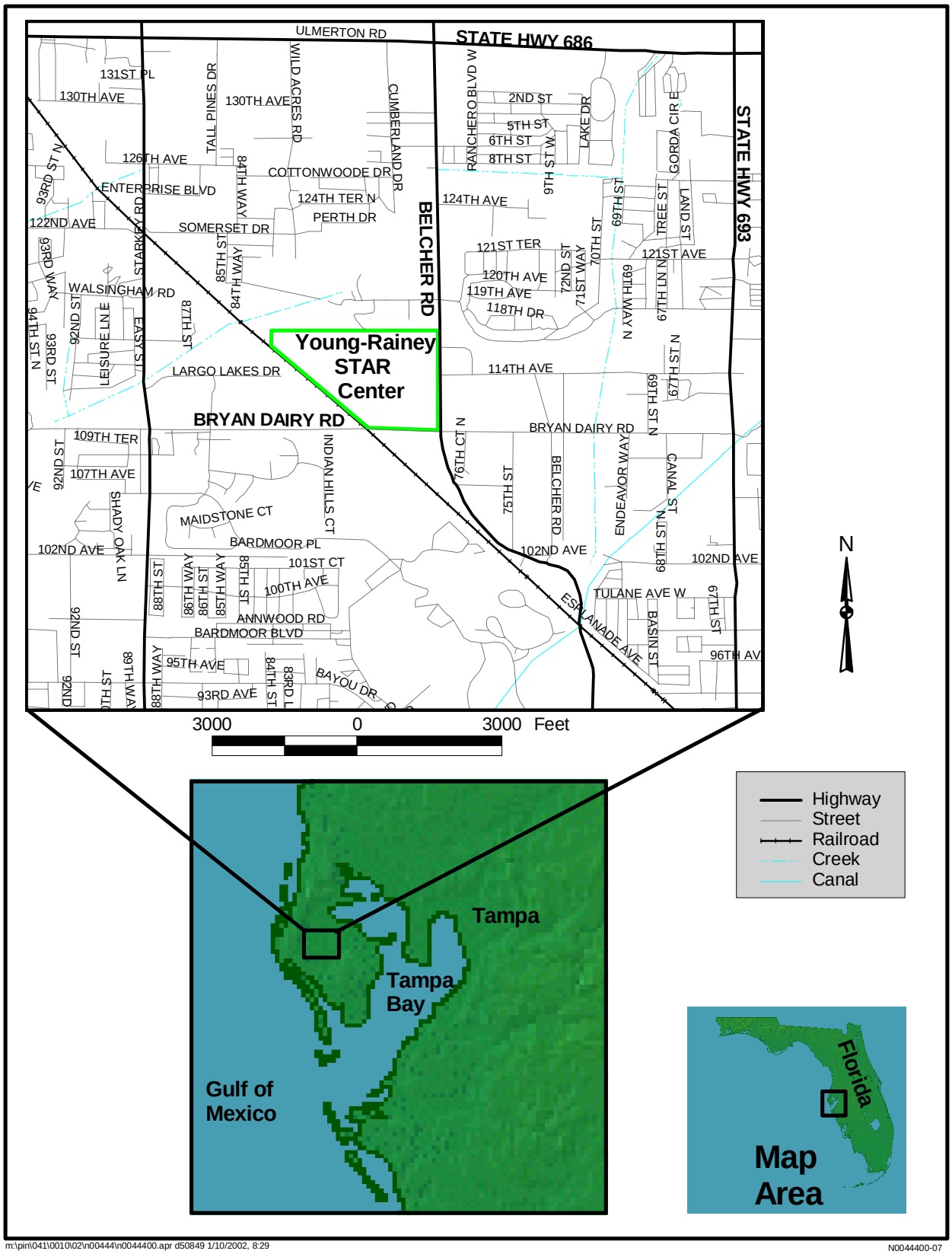

Figure 1. Young - Rainey STAR Center Location

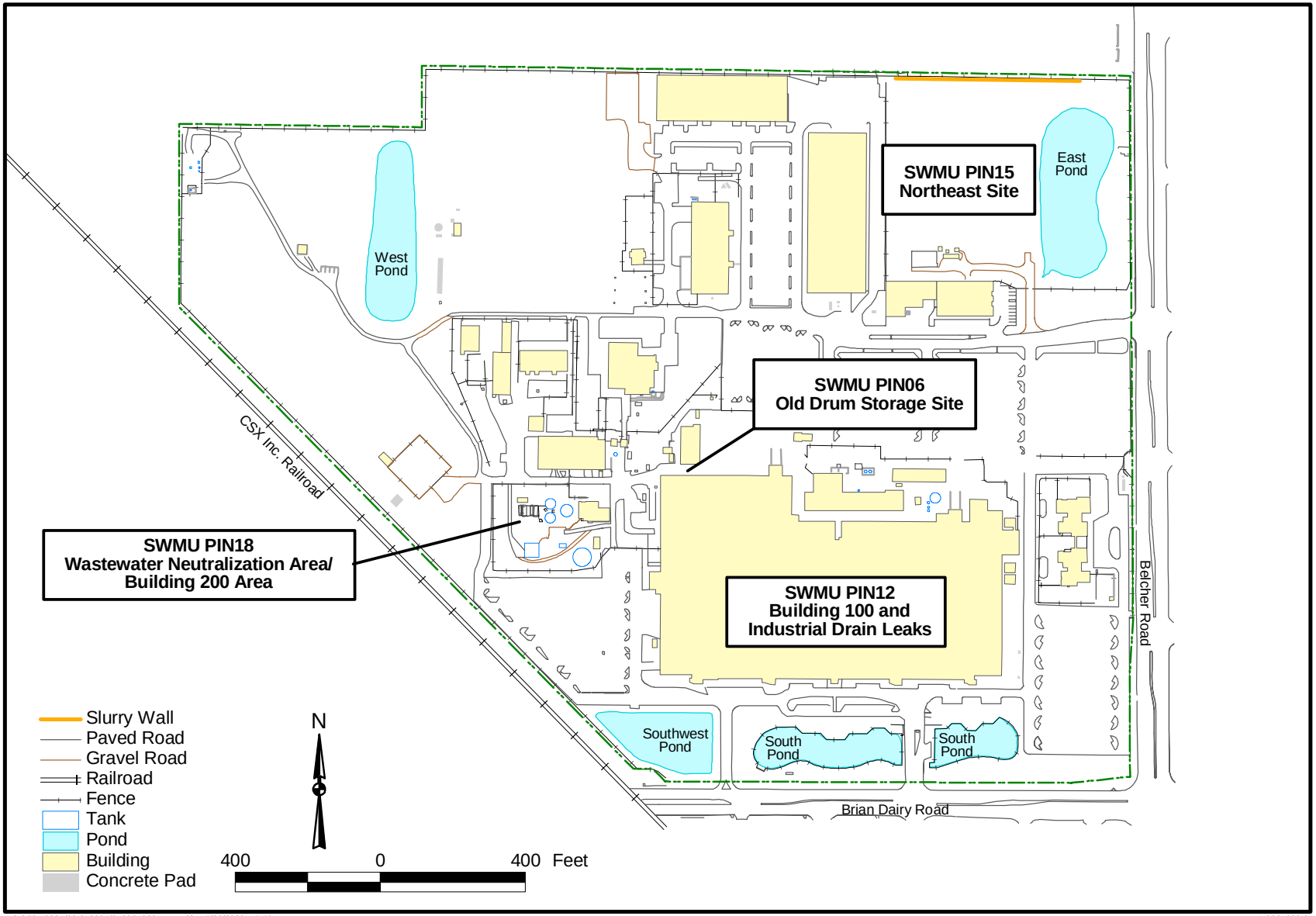

Figure 2. Location of STAR Center Solid Waste Management Units (SWMUs)

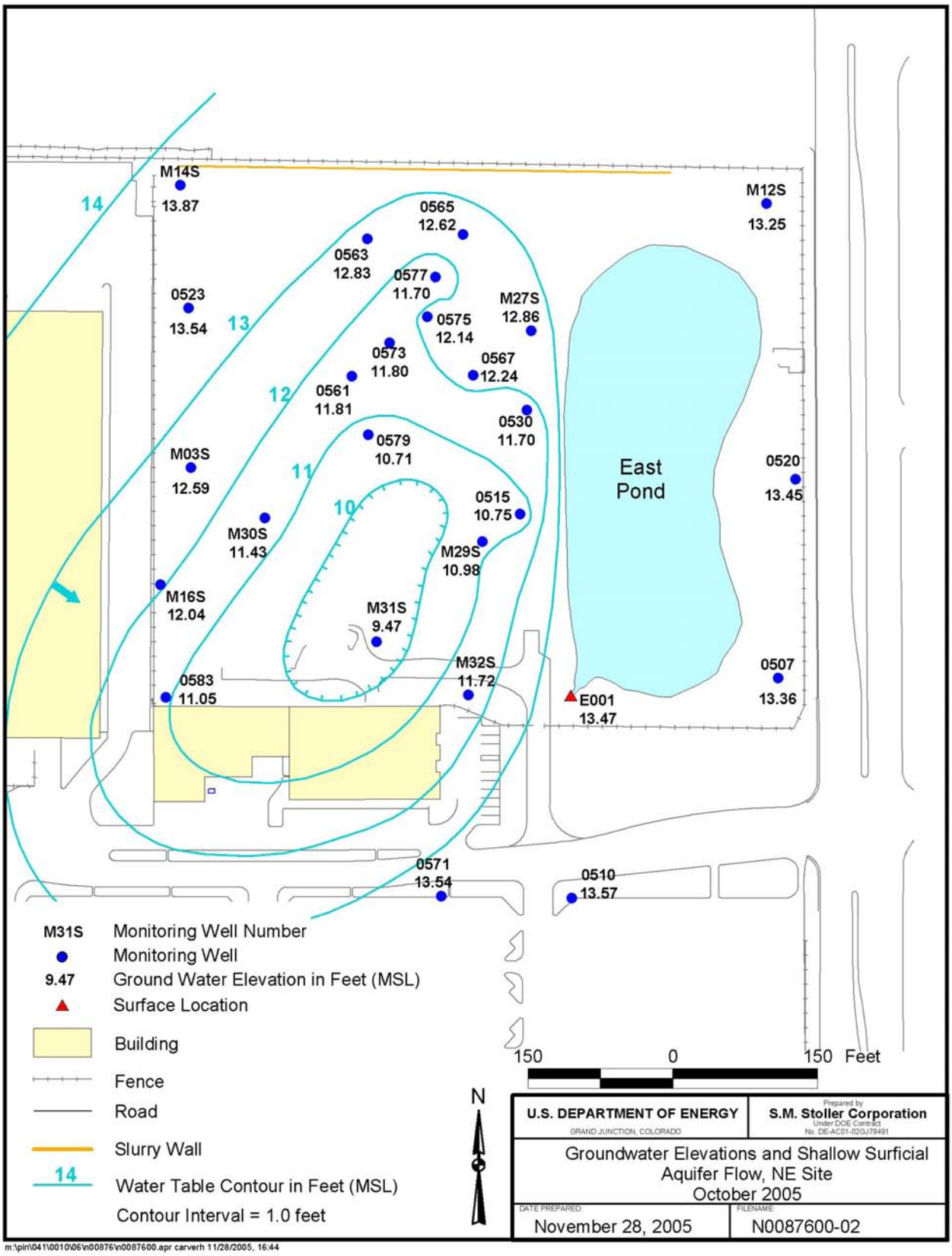

Figure 3. Ground Water Elevations and Shallow Surficial Aquifer Flow, Northeast Site, October 2005

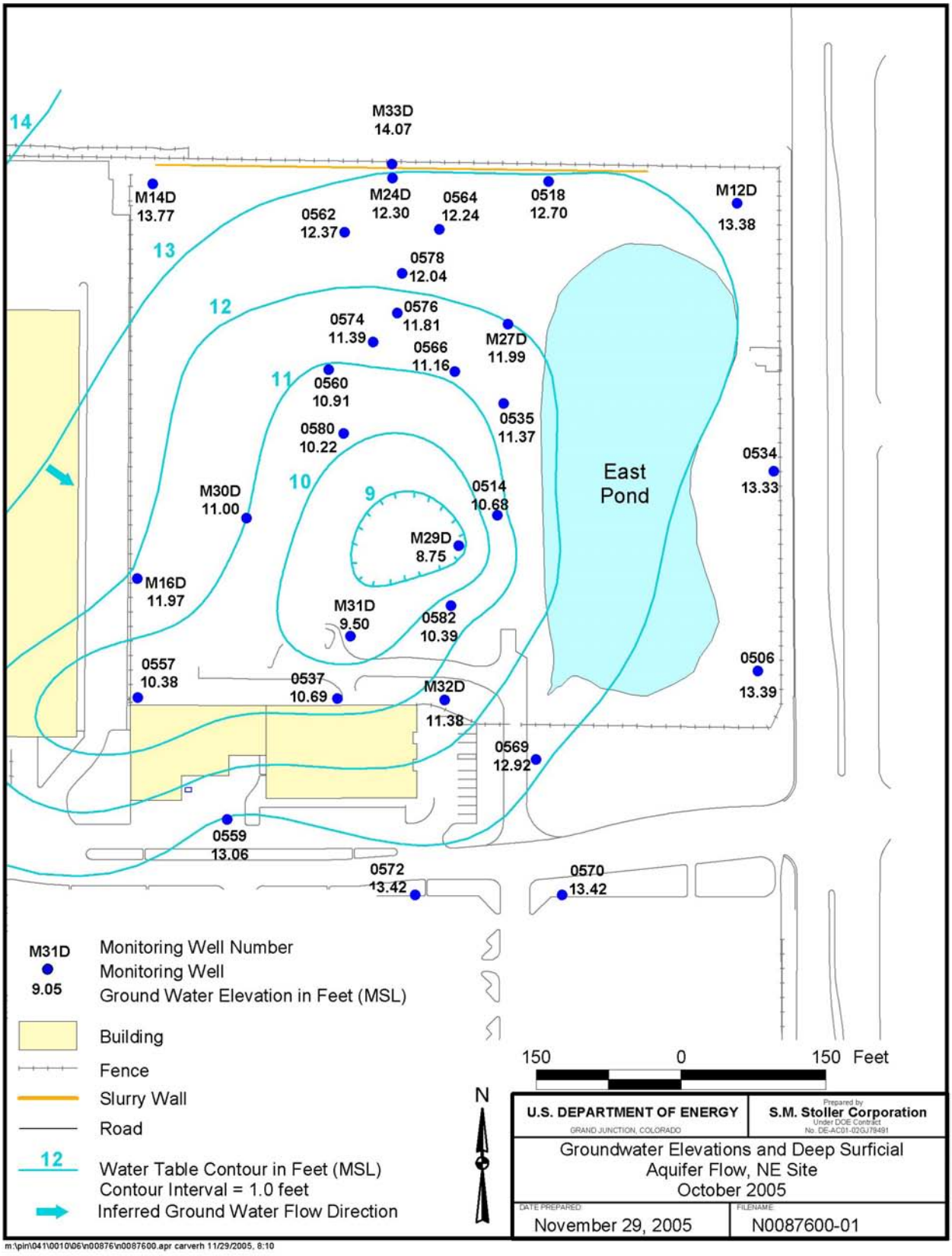

Figure 4. Ground Water Elevations and Deep Surficial Aquifer Flow, Northeast Site, October 2005

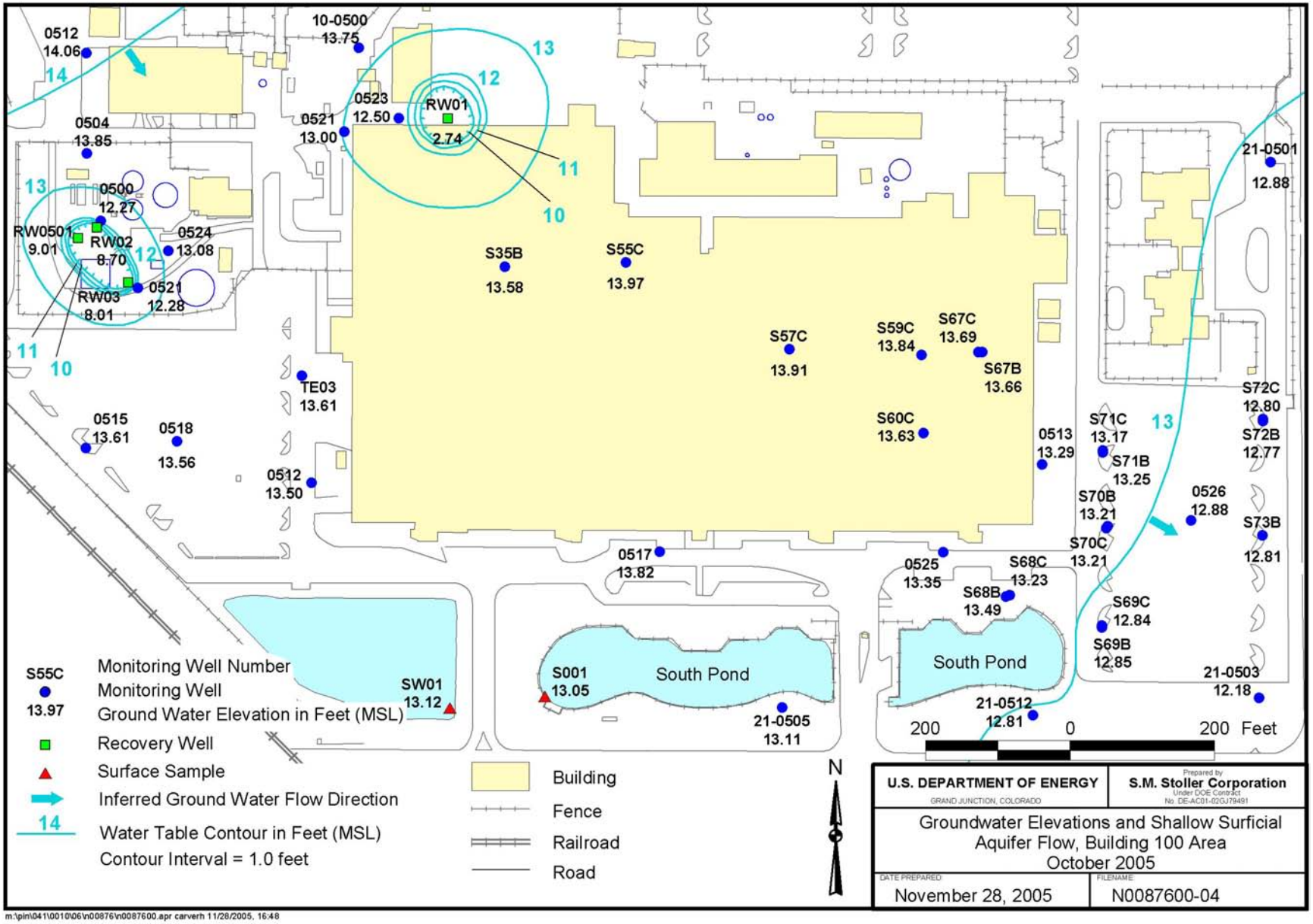

Figure 5. Ground Water Elevations and Shallow Surficial Aquifer Flow, Building 100 Area, October 2005

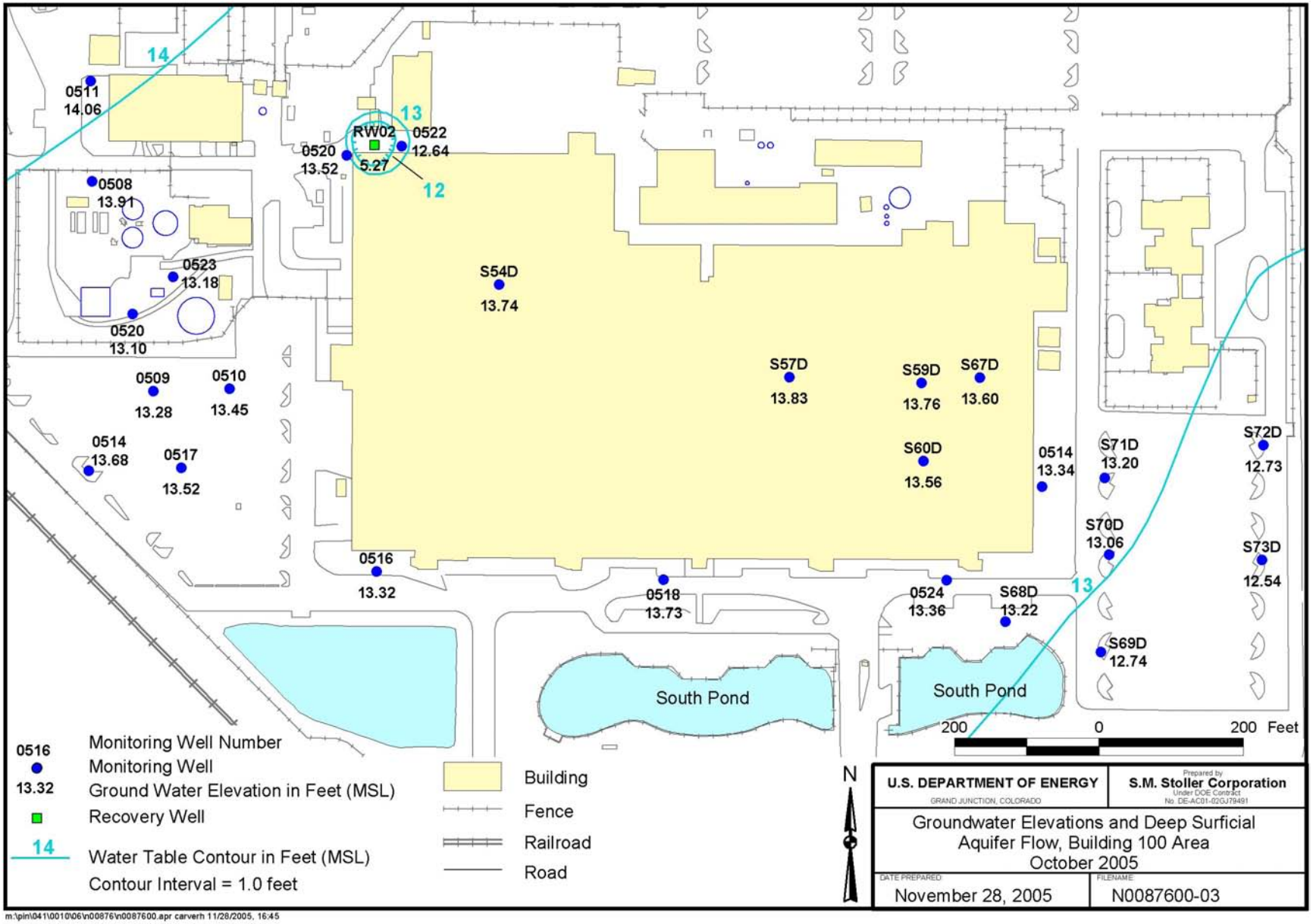

Figure 6. Ground Water Elevations and Deep Surficial Aquifer Flow, Building 100 Area, October 2005

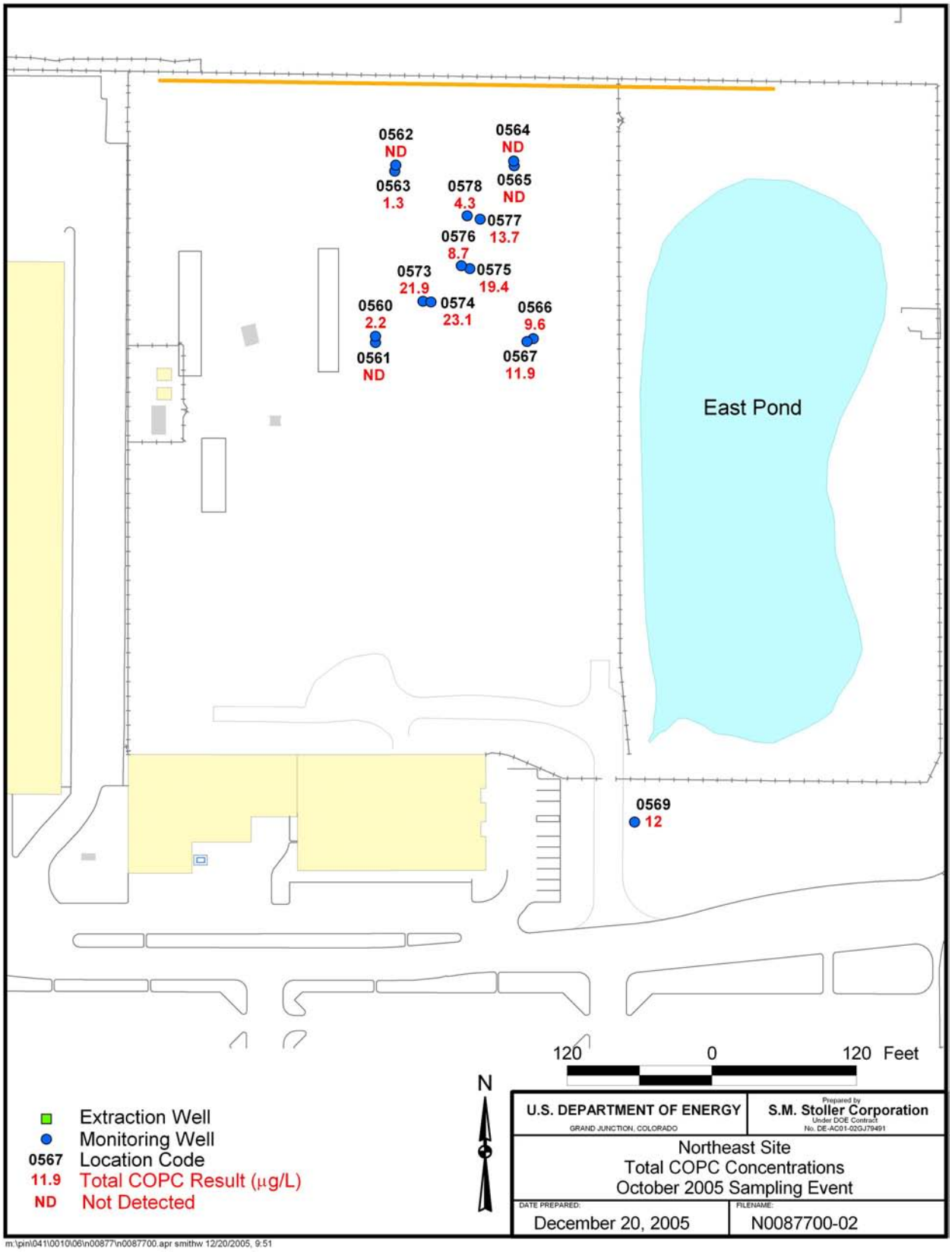

Figure 7. Northeast Site Total COPC Concentrations October 2005 Sampling Event

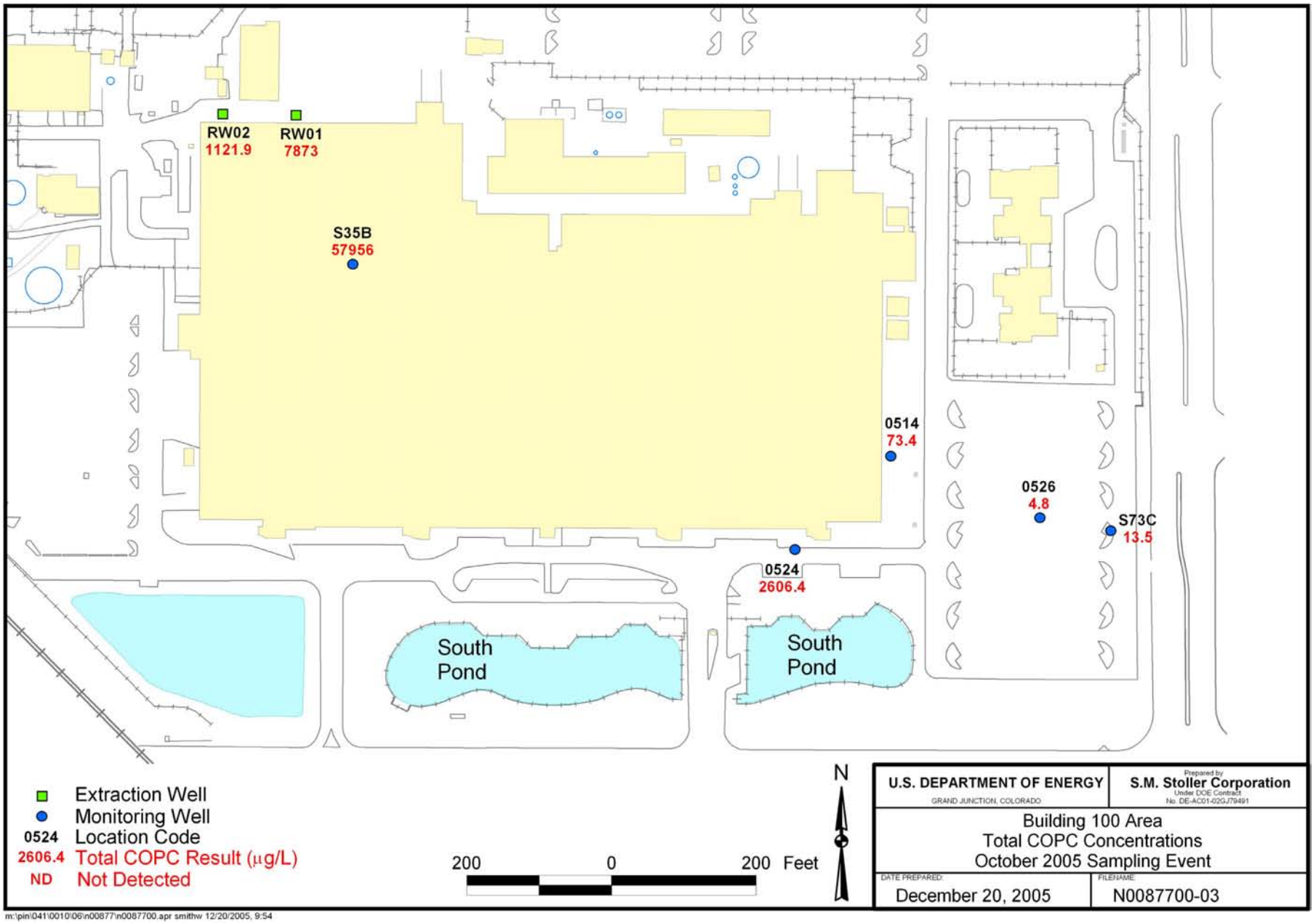

Figure 8. Building 100 Area Total COPC Concentrations October 2005 Sampling Event

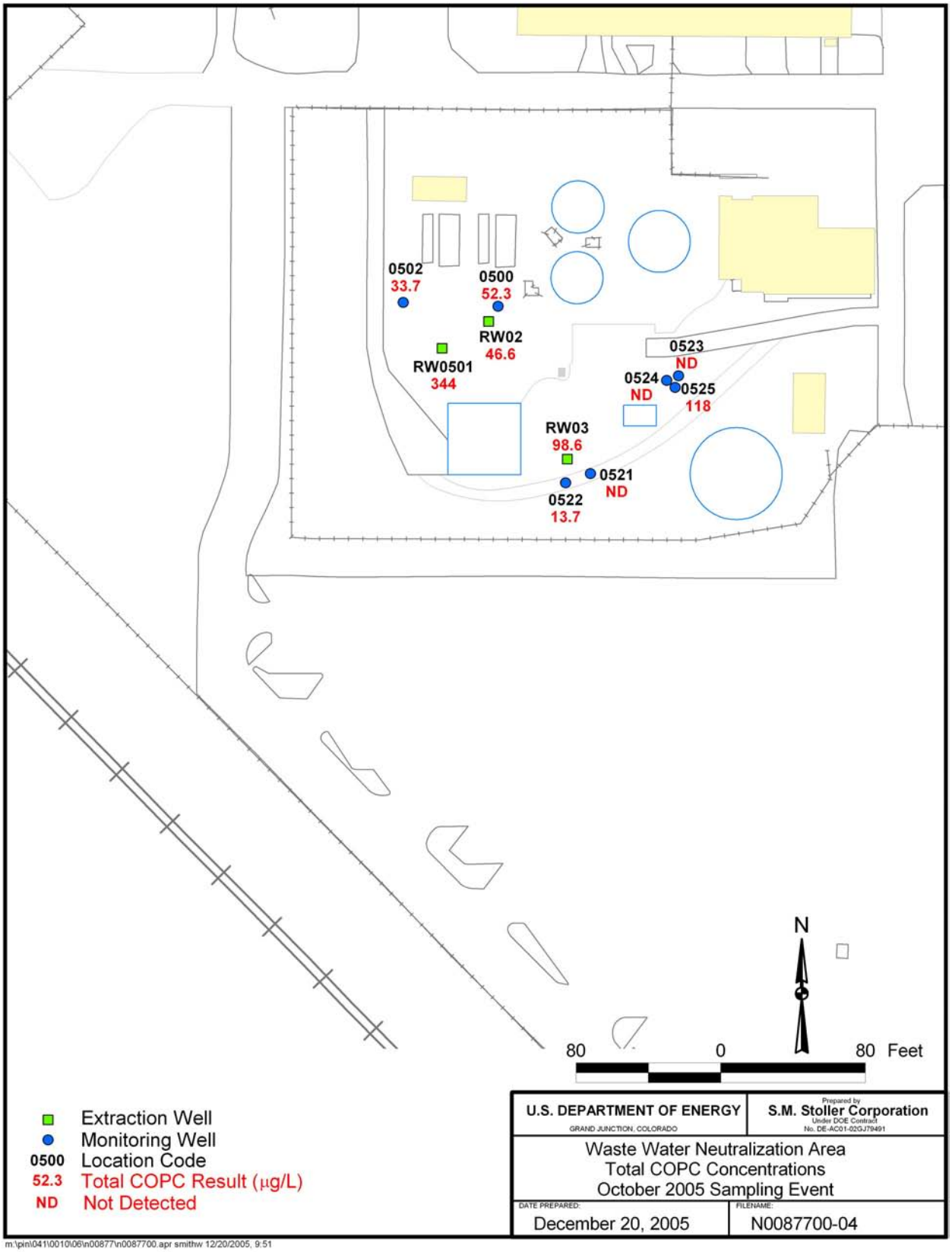

Figure 9. WWNA Total COPC Concentrations October 2005 Sampling Event

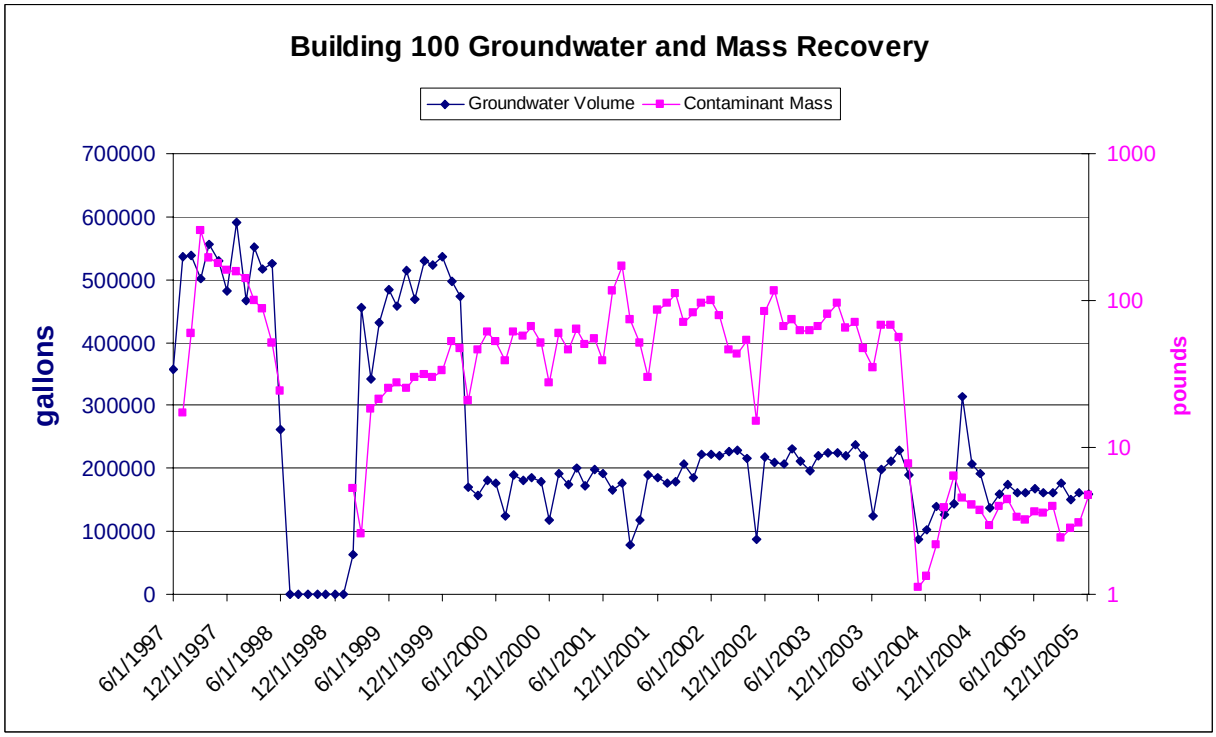

Figure 10. Building 100 Ground Water Recovery and VOC Mass Removal

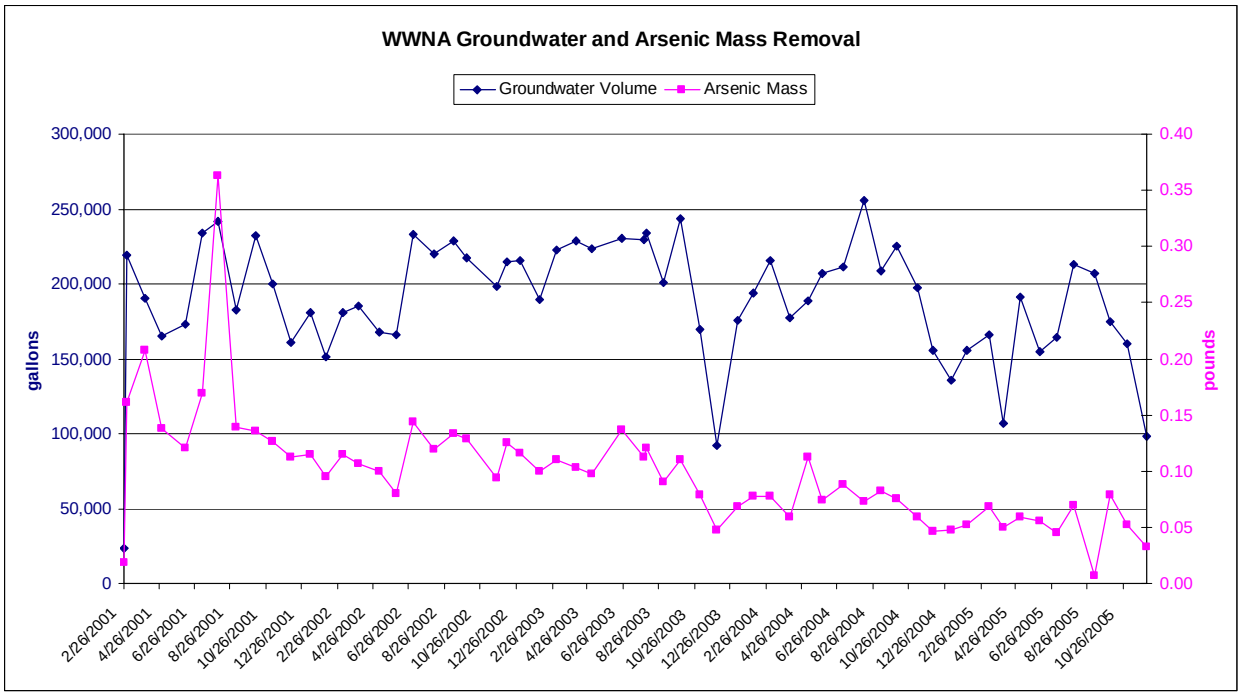

Figure 11. WWNA Ground Water and Arsenic Mass Removal

Table 1. WWNA Recovery Well Arsenic Concentrations
(reported in milligrams per liter)

Sample Date	RW02	RW03	RW0501[a]	RW02/RW03/RW0501 combined effluent
2/26/2001	0.08	0.1		0.095
2/27/2001	0.074	0.1		0.091
2/28/2001	0.074	0.091		0.074
3/1/2001	0.084	0.096		0.088
3/2/2001	0.088	0.095		0.089
3/5/2001	0.13	0.22		0.1
3/12/2001	0.37	0.11		0.13
3/19/2001	0.42	0.12		0.12
3/26/2001	0.15	0.16		0.8
4/2/2001	0.18	0.12		0.13
4/16/2001	0.18	0.17		0.13
5/1/2001	0.16	0.071		0.1
5/15/2001	0.14	0.15		0.093
5/30/2001	0.13	0.07		0.16
6/11/2001	0.11	0.068		0.083
6/26/2001	0.13	0.067		0.096
7/9/2001	0.14	0.054		0.087
7/23/2001	0.14	0.25		0.074
8/6/2001	0.11	0.2		0.18
8/21/2001	0.13	0.074		0.084
9/5/2001	0.13	0.054		0.091
10/8/2001	0.11	0.14		0.07
11/6/2001	0.095	0.053		0.076
12/7/2001	0.13	0.081		0.084
1/10/2002	0.11	0.081		0.076
2/5/2002	0.11	0.055		0.075
3/6/2002	0.12	0.05		0.076
4/2/2002	0.084	0.055		0.069
4/15/2002	--	0.049		--
4/16/2002	0.078	--		--
5/8/2002	0.11	0.048		0.071
6/4/2002	0.095	0.078		0.058
7/3/2002	0.16	0.056		0.074
7/15/2002	0.098	0.057		--
8/8/2002	0.0036J	0.11		0.065
9/10/2002	0.12	0.097		0.07
10/3/2002	0.097	0.054		0.071
11/22/2002	0.11	0.067		0.057
12/11/2002	0.11	0.056		0.07
1/2/2003	0.097	0.049		0.064
1/13/2003	0.082	0.061		--
2/4/2003	0.12	0.047		0.063
3/4/2003	0.079	0.19		0.059
4/7/2003	0.081	0.071		0.054
5/5/2003	0.074	0.038		0.052
6/3/2003	0.089	0.042		0.054
6/11/2003	0.07	0.044	0.42	0.073
6/12/2003	0.074	0.048	0.32	0.066
6/13/2003	0.072	0.075	0.21	0.066

Table 1 (continued). WWNA Recovery Well Arsenic Concentrations
(reported in milligrams per liter)

Sample Date	RW02	RW03	RW0501[a]	RW02/RW03/RW0501 combined effluent
6/16/2003	0.071	0.3	0.28	0.063
6/17/2003	0.068	0.11	0.26	0.066
6/24/2003	0.07	0.039	0.18	0.071
7/1/2003	0.059	0.038	0.18	0.064
7/10/2003	0.062	0.04	0.17	0.058
7/11/2003	0.056	0.034	0.24	0.054
7/14/2003	0.15	0.04	0.16	0.065
7/15/2003	0.071	0.038	0.19	0.055
7/16/2003	0.11	0.038	0.18	0.051
7/22/2003	0.15	0.041	0.16	0.054
7/31/2003	0.056	0.036	0.17	0.059
8/6/2003	0.069	0.041	0.16	0.062
9/3/2003	0.092	0.041	0.19	0.054
10/2/2003	0.13	0.032	0.14	0.054
11/5/2003	0.054	0.053	0.18	0.056
12/3/2003	0.076	0.044	0.18	0.062
1/7/2004	0.0363	0.0374	0.131	0.0467
2/3/2004	0.0433	0.0665	1.02	0.0481
3/3/2004	0.169	0.0435	0.142	0.0429
4/6/2004	0.0507	0.0483	0.147	0.0404
5/5/2004	0.0309	0.437	0.536	0.0706
6/1/2004	0.0541	0.23	3.13	0.0434
7/6/2004	0.564	0.698	0.123	0.0498
8/10/2004	0.049	0.0479	0.158	0.0339
9/9/2004	0.0427	0.0422	0.199	0.047
10/5/2004	0.0643	0.0353	0.116	0.0404
11/9/2004	0.0382	0.0385	0.137	0.036
12/7/2004	0.046	0.0341	0.0997	0.036
1/6/2005	0.0346	0.0312	0.0888	0.042
2/2/2005	0.0355	0.034	0.0985	0.0402
3/11/2005	0.0393	0.0336	0.0874	0.0487
4/5/2005	0.0509	0.0838	0.0916	0.0559
5/6/2005	0.0298	0.035	0.202	0.0374
6/6/2005	0.0383	0.0363	0.108	0.0427
7/6/2005	0.0335	0.0488	0.24	0.0331
8/4/2005	0.06	0.029	0.11	0.0386
9/7/2005	0.362	0.0395	0.0344	0.0037B
10/4/2005	0.0466	0.0986	0.344	0.0541
11/3/2005	0.457	0.0582	0.11	0.0387
12/5/2005	0.157	0.0427	0.366	0.0391

[a]Recovery well RW0501 was brought online on June 11, 2003.
B Estimated value for inorganics; result is between the instrument detection limit and the reporting limit.
-- = Not Measured.

Table 2. Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
PIN06	**Industrial Drain Leaks Bldg 100 / Old Drum Storage Site**			
0500	10/14/2005	10:59	4.45	13.55
0501	10/14/2005	11:04	4.84	13.46
PIN09				
0500	10/14/2005	10:56	4.27	13.70
PIN10				
0500	10/14/2005	11:01	4.15	13.75
PIN12				
0508	10/14/2005	11:20	4.10	14.26
0509	10/14/2005	11:18	3.99	14.05
0510	10/14/2005	11:16	3.76	14.30
0511	10/14/2005	13:58	4.22	13.58
0512	10/14/2005	14:02	3.31	13.50
0513	10/14/2005	14:45	5.21	13.29
0514	10/14/2005	14:46	5.16	13.34
0515	10/14/2005	14:06	4.57	13.33
0516	10/14/2005	14:04	4.68	13.32
0517	10/14/2005	14:30	4.08	13.82
0518	10/14/2005	14:27	4.21	13.73
0520	10/14/2005	11:00	4.49	13.52
0521	10/14/2005	10:57	5.05	13.00
0522	10/14/2005	11:06	5.56	12.64
0523	10/14/2005	11:08	5.66	12.50
0524	10/14/2005	14:50	4.05	13.36
0525	10/14/2005	14:51	4.07	13.35
0526	10/14/2005	13:55	3.94	12.88
0527	10/14/2005	12:40	12.35	5.72
0528	10/14/2005	14:22	11.79	5.81
RW01	10/14/2005	09:24	15.51	2.74
RW02	10/14/2005	09:26	13.06	5.27
S29C	10/14/2005	10:26	5.10	13.41
S30B	10/14/2005	10:45	5.05	13.46
S31B	10/14/2005	10:23	5.03	13.48
S32B	10/14/2005	10:30	5.12	13.39
S33C	10/14/2005	10:34	5.21	13.30
S35B	10/14/2005	10:52	4.93	13.58
S36B	10/14/2005	10:18	4.91	13.60
S37B	10/14/2005	10:37	4.93	13.58
S54D	10/14/2005	10:54	4.77	13.74
S55B	10/14/2005	10:59	4.58	13.93
S55C	10/14/2005	11:00	4.54	13.97
S56B	10/14/2005	11:07	4.64	13.87
S56C	10/14/2005	11:08	4.63	13.88
S56D	10/14/2005	11:09	4.61	13.90

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
S57B	10/14/2005	11:03	4.56	13.95
S57C	10/14/2005	11:04	4.60	13.91
S57D	10/14/2005	11:04	4.68	13.83
S59B	10/14/2005	09:42	4.68	13.83
S59C	10/14/2005	09:43	4.67	13.84
S59D	10/14/2005	09:40	4.75	13.76
S60B	10/14/2005	09:49	4.83	13.68
S60C	10/14/2005	09:50	4.88	13.63
S60D	10/14/2005	09:51	4.95	13.56
S67B	10/14/2005	09:58	4.81	13.66
S67C	10/14/2005	10:01	4.78	13.69
S67D	10/14/2005	10:02	4.88	13.60
S68B	10/14/2005	15:09	4.41	13.49
S68C	10/14/2005	15:12	4.67	13.23
S68D	10/14/2005	15:07	4.68	13.22
S69B	10/14/2005	14:13	3.15	12.85
S69C	10/14/2005	14:13	3.16	12.84
S69D	10/14/2005	14:12	3.26	12.74
S70B	10/14/2005	14:27	3.49	13.21
S70C	10/14/2005	14:27	3.49	13.21
S70D	10/14/2005	14:25	3.64	13.06
S71B	10/14/2005	14:39	5.15	13.25
S71C	10/14/2005	14:37	5.23	13.17
S71D	10/14/2005	14:35	5.20	13.20
S72B	10/14/2005	13:34	5.43	12.77
S72C	10/14/2005	13:36	5.40	12.80
S72D	10/14/2005	13:37	5.47	12.73
S73B	10/14/2005	13:41	4.19	12.81
S73D	10/14/2005	13:44	4.46	12.54
TE03	10/14/2005	14:00	3.39	13.61
PIN15	**Northeast Site**			
0506	10/14/2005	10:03	3.61	13.39
0507	10/14/2005	10:02	3.64	13.36
0510	10/14/2005	13:03	3.95	13.57
0513	10/14/2005	09:54	11.89	5.71
0514	10/14/2005	08:52	6.82	10.68
0515	10/14/2005	08:53	6.75	10.75
0518	10/14/2005	09:46	5.10	12.70
0520	10/14/2005	09:59	3.75	13.45
0523	10/14/2005	09:28	4.46	13.54
0530	10/14/2005	08:58	5.70	11.70
0534	10/14/2005	09:58	3.97	13.33
0535	10/14/2005	08:57	6.23	11.37
0537	10/14/2005	08:36	7.91	10.69
0557	10/14/2005	08:30	8.72	10.38

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
0559	10/14/2005	13:16	5.73	13.06
0560	10/14/2005	09:04	7.09	10.91
0561	10/14/2005	09:05	6.19	11.81
0562	10/14/2005	09:35	5.43	12.37
0563	10/14/2005	09:36	4.97	12.83
0564	10/14/2005	09:44	4.96	12.24
0565	10/14/2005	09:43	4.58	12.62
0566	10/14/2005	10:22	6.34	11.16
0567	10/14/2005	10:23	5.26	12.24
0569	10/14/2005	12:48	5.46	12.92
0570	10/14/2005	12:59	4.56	13.42
0571	10/14/2005	13:13	3.93	13.54
0572	10/14/2005	13:11	4.09	13.42
0573	10/14/2005	10:36	6.58	11.80
0574	10/14/2005	13:34	7.03	11.39
0575	10/14/2005	10:31	5.70	12.14
0576	10/14/2005	10:32	5.67	11.81
0577	10/14/2005	10:38	5.94	11.70
0578	10/14/2005	10:37	5.48	12.04
0579	10/14/2005	08:20	7.69	10.71
0580	10/14/2005	08:23	8.18	10.22
0582	10/14/2005	08:14	7.01	10.39
0583	10/14/2005	08:10	8.15	11.05
E001	10/14/2005	10:10	2.55	13.47
M03D	10/14/2005	08:18	5.55	12.55
M03S	10/14/2005	08:16	5.51	12.59
M12D	10/14/2005	09:50	3.82	13.38
M12S	10/14/2005	09:51	4.25	13.25
M14D	10/14/2005	09:32	4.23	13.77
M14S	10/14/2005	09:31	4.13	13.87
M16D	10/14/2005	08:24	6.23	11.97
M16S	10/14/2005	08:28	6.16	12.04
M24D	10/14/2005	09:38	5.50	12.30
M27D	10/14/2005	10:20	5.61	11.99
M27S	10/14/2005	10:18	4.74	12.86
M29D	10/14/2005	08:48	8.85	8.75
M29S	10/14/2005	08:49	6.62	10.98
M30D	10/14/2005	09:10	6.90	11.00
M30S	10/14/2005	09:05	6.37	11.43
M31D	10/14/2005	08:40	8.50	9.50
M31S	10/14/2005	08:41	8.53	9.47
M32D	10/14/2005	08:45	6.42	11.38
M32S	10/14/2005	08:43	6.08	11.72
M33D	10/14/2005	09:38	3.53	14.07

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
PIN18	**Wastewater Neutralization Area**			
0500	10/14/2005	10:35	7.83	12.27
0502	10/14/2005	10:40	7.87	12.13
0503	10/14/2005	13:50	4.23	13.45
0504	10/14/2005	10:41	5.75	13.85
0508	10/14/2005	10:45	5.59	13.91
0509	10/14/2005	13:53	4.55	13.28
0510	10/14/2005	13:55	4.31	13.45
0511	10/14/2005	13:28	4.74	14.06
0512	10/14/2005	13:24	4.54	14.06
0513	10/14/2005	13:23	4.63	14.17
0514	10/14/2005	13:44	4.10	13.68
0515	10/14/2005	13:41	4.80	13.61
0516	10/14/2005	13:42	4.68	13.73
0517	10/14/2005	14:12	4.73	13.52
0518	10/14/2005	14:14	4.64	13.56
0519	10/14/2005	14:11	4.73	13.55
0520	10/14/2005	10:32	4.90	13.10
0521	10/14/2005	10:31	5.82	12.28
0522	10/14/2005	10:34	5.83	12.27
0523	10/14/2005	10:28	6.22	13.18
0524	10/14/2005	10:29	5.92	13.08
0525	10/14/2005	10:53	5.76	13.14
0526	10/14/2005	13:33	4.80	13.80
RW02	10/14/2005	09:17	11.40	8.70
RW03	10/14/2005	09:16	10.29	8.01
RW0501	10/14/2005	09:19	10.99	9.01
PIN21	**Perimeter Monitoring Wells**			
0500	10/14/2005	13:25	5.06	13.04
0501	10/14/2005	13:23	5.12	12.88
0502	10/14/2005	14:01	3.04	12.16
0503	10/14/2005	14:00	3.02	12.18
0504	10/14/2005	14:38	4.57	13.03
0505	10/14/2005	14:37	4.29	13.11
0512	10/14/2005	14:20	4.49	12.81
PIN23	**Southwest Pond**			
SW01	10/14/2005	10:41		13.12
PIN37	**South Pond**			
S001	10/14/2005	14:42		13.05

Table 3. Floridan Aquifer Monitoring Well Water Elevations

Well Identification	July 2005 Water Level Elevation (ft, MSL)	October 2005 Water Level Elevation (ft, MSL)
PIN15−0513	7.45	5.71
PIN12−0527	7.41	5.72
PIN12−0528	7.60	5.81

Table 4. Vertical Hydraulic Differential

Water Level Measured From	Well Identification	Water Level Elevation (ft, MSL)
Deep Surficial Aquifer	PIN15−M12D	13.38
Floridan Aquifer	PIN15−0513	5.71

Table 5. Surface Water Elevations

Pond Location	July 2005 Water Level Elevation (ft, MSL)	October 2005 Water Level Elevation (ft, MSL)
East Pond	14.25	13.47
South Pond	13.57	13.05
West Pond	Not measured	Not measured
Southwest Pond	13.57	13.12

Table 6. Dissolved Gas and Bacteria

Location		Date Sampled	Ethane (µg/L)	Ethene (µg/L)	Hydrogen (nmol/L)	Methane (µg/L)	Carbon dioxide (mg/L)	Dehalococcoides ethenogenes (copy numbers/L)
Industrial Drain Leaks Bldg. 100/Old Drum Storage Site								
PIN12	0514	10/6/2005	0.2	2	1.5	9,600	120	Not Detected
	0524	10/10/2005	0.33	19	0.75	4,200	120	14,300,000
	0526	10/10/2005	<0.01	<0.01	180	4,500	280	41,100
	S35B	10/7/2005	120	1,200	0.83	3,100	150	1,660,000
	S73C	10/7/2005	0.021	0.48	7.5	7,400	220	1,190,000
Pinellas Northeast Site								
PIN15	0567	10/5/2005	9.4	0.032	1.6	150	140	921,000
	0569	10/6/2005	1,000	<0.01	0.69	3,000	130	745,000
	0574	10/5/2005	1.5	1.2	1.1	2,700	84	16,900,000
	0576	10/5/2005	2.9	0.23	1.5	3,700	75	4,000,000
	0577	10/5/2005	130	21	1.4	4,200	270	2,460,000

"<"=not detected above the associated value

Table 7. Field Measurements of Samples Collected at the STAR Center

Location	Screen Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
PIN06	**Industrial Drain Leaks Bldg 100 / Old Drum Storage Site**						
0501	3–13	28.6	1,157	3.2	6.5	20	0.82
PIN09							
0500	3–13	30.2	847	4.7	6.77	-74.1	0.68
PIN10							
0500	3–13	27.4	614	4.9	6.64	-33.8	0.59
PIN12							
0514	30–40	25.84	1,482	212	6.53	-14.8	0.38
0524	27–37	27.35	1,515	2.3	6.51	19.7	0.23
0525	12–22	28.31	780	6.62	6.78	-75	0.61
0526	19.5–29.5	31.58	2,054	20.3	6.39	-286.9	7.62
S31B	5–15	25	562	12.4	6.71	179.4	0.41
S32B	5.5–15.5	22.97	1,739	2.62	6.69	198	0.94
S33C	11–21	24.1	1,336	78.9	6.64	84.3	0.31
S35B	5–15	22	1,659	13.3	6.36	182.2	0.34
S68B	10–20	27.23	861	11.6	6.63	-59.9	0.75
S73C	20–30	30.01	1,905	76.4	6.48	-70.9	0.9
PIN15	**Northeast Site**						
0560	19–28.5	28	1,082	7.3	6.51	-65.9	0.74
0561	5–14.5	27.8	1,409	2.7	6.54	-43.6	0.82
0562	20–29.5	28.68	1,150	4.67	6.61	-34.2	1.15
0563	5–14.5	29.14	1,711	2.54	6.46	-10.4	1.09
0564	20–29.5	27.91	1,610	10.1	6.64	-21	0.94
0565	5–14.5	28.37	922	7.24	6.56	-9.6	1.01
0566	19–28.5	30.1	1,455	259	6.57	-66.4	0.8
0567	5–14.5	30.12	1,236	15.6	6.72	-51.5	0.77
0569	20–30	27.44	1,472	63.8	6.54	46	0.67
0573	5–15	32.96	1,702	3.4	6.77	56.5	0.66
0574	18–28	33.68	1,161	13.5	6.91	-44.3	0.47
0575	5–15	32.98	1,756	10.5	7.24	-149.8	0.56
0576	20–30	36.55	1,422	7.75	6.99	-41.2	0.39
0577	5–15	32.49	2,115	5.36	6.75	-120	0.59
0578	20–30	33.3	1,194	10	6.03	7.1	1.38
M03S	2.5–12	27.5	898	6.2	6.76	-49.2	0.61
M14S	4–14	27.1	770	12.7	6.85	-36.1	0.52
M32S	3–13	28.2	800	6.7	6.71	-10.3	0.8

Table 7 (continued). Field Measurements of Samples Collected at the STAR Center

Location	Screen Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
PIN18	**Wastewater Neutralization Area**						
0500	11–16	27.6	435	7	7.34	-124.8	0.51
0502	11–16	27.7	697	4.8	6.81	-55.6	0.83
0521	20–30	25.7	838	2	6.92	-67.5	0.54
0522	5–15	27.6	679	8.5	6.79	-34.9	0.63
0523	32.5–42.5	25.8	1,160	23.7	6.82	-44.2	0.67
0524	20–30	26.3	676	8.9	6.89	-67.4	0.53
0525	5–15	28.1	324	14.1	6.66	89.8	0.91

[a]Temperature corrected to 25°C.
-- Not measured.

Table 8. Sitewide Arsenic Measurements

Location	Sample Date	Concentration (mg/L)
PIN06	**Industrial Drain Leaks Bldg. 100/Old Drum Storage Site**	
0501	10/6/2005	0.0168
PIN09		
0500	10/6/2005	0.0224
PIN10		
0500	10/6/2005	0.0118
PIN12		
0525	10/7/2005	0.0201
S31B	10/7/2005	0.033
S32B	10/7/2005	0.0094B
S33C	10/7/2005	0.0067B
S35B	10/7/2005	0.0085B
S68B	10/7/2005	0.0569
PIN15	**Northeast Site**	
0567	10/5/2005	0.0118
M03S	10/5/2005	0.0057B
M14S	10/5/2005	0.0233
M32S	10/6/2005	0.0089B
PIN18	**Wastewater Neutralization Area**	
0500	10/5/2005	0.0523
0502	10/5/2005	0.0337
0521	10/5/2005	<0.0029
0522	10/5/2005	0.0137
0523	10/5/2005	<0.0029
0524	10/5/2005	0.0089B
0525	10/5/2005	0.118
RW02	10/4/2005	0.0466
RW03	10/4/2005	0.0986
RW0501	10/4/2005	0.344

B = Inorganic result is between the IDL and CRDL
"<" values are method detection limits.

Table 9. COPC Concentrations at the Northeast Site
(reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
PIN15	**Northeast Site**									
0506	12–21.5	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0507	5–14.5	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0510	4–13.5	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0513	135–149.6	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0514	15.5–25.5	4/6/2005	<0.5	<0.5	ND	<0.5	<1	15.7	<0.5	15.7
0515	7.6–17.6	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0516	0.3–10.3	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0518	23–28	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0520	5–14.5	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0523	5–14.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0530	5–14.5	4/6/2005	<0.5	<0.5	ND	11	<1	<1	<0.5	11
0534	19.5–29	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0535	20.5–30	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0537	17.5–30	4/6/2005	1.3	129	130.5	413	<1	3.2	<0.5	548
0557	21–31	10/8/2004	<0.5	<0.5	ND	2.9	<1	<0.5	<0.5	2.9
		1/12/2005	<0.5	<0.5	ND	3.1	<1	<0.5	<0.5	3.1
		4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0559	22–31.5	4/13/2005	<0.5	<0.5	ND	1.4	<1	3.1	<0.5	4.5
0560	19–28.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/12/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		10/10/2005	0.86J	0.95J	0.95J	2.2	<1	<0.5	<0.5	2.2
0561	5–14.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/12/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		10/10/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0562	20–29.5	10/7/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	1.1J	<0.5	<0.5	ND
		10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0563	5–14.5	10/8/2004	<0.5	2.1	2.1	<0.5	<1	<0.5	<0.5	2.1
		1/11/2005	<0.5	1.4	1.4	<0.5	<1	<0.5	<0.5	1.4
		4/7/2005	<0.5	1.3	1.3	<0.5	<1	<0.5	<0.5	1.3
		7/18/2005	<0.5	1.1	1.1	<0.5	<1	<0.5	<0.5	1.1
		10/7/2005	0.51J	1.3	1.3	<0.5	<1	<0.5	<0.5	1.3

Table 9 (continued). COPC Concentrations at the Northeast Site (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
0564	20–29.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0565	5–14.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0566	19–28.5	10/12/2004	<0.5	4.7	4.7	4.5	<1	1.5	<0.5	10.7
		1/12/2005	<0.5	3.8	3.8	3.8	<1	1.3	<0.5	8.9
		4/14/2005	<0.5	4.9	4.9	4.8	<1	1.4	<0.5	11.1
		7/18/2005	160	83	84.3	20.5	<1	2	<0.5	266.8
		10/10/2005	0.82J	5.6	5.6	2.9	<1	1.1	<0.5	9.6
0567	5–14.5	10/12/2004	1.8	68	83.4	34.5	<1	12.8	<0.5	132.5
		1/12/2005	1.3	52.3	63.8	22.7	<1	7.2	<0.5	95
		4/14/2005	1.2	49.5	60.6	24.7	<1	5.6	<0.5	92.1
		7/18/2005	<0.5	5.7	7.2	3	<1	<0.5	<0.5	10.2
		10/5/2005	0.66J	7.7	10	1.9	<1	0.53J	<0.5	11.9
0568	10–20	4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0569	20–30	4/12/2005	<0.5	1.3	1.3	33.7	<1	<0.5	10.6	45.6
		10/6/2005	<0.5	<0.5	ND	12	<1	<0.5	<0.5	12
0570	20–30	4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0571	10–20	4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0572	20–30	4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0573	5–15	10/11/2004	<0.5	12.6	12.6	12.7	<1	0.66J	1.2	26.5
		1/11/2005	<0.5	19.7	19.7	22.9	<1	0.89J	1.5	44.1
		4/7/2005	<0.5	5.3	5.3	24.8	<1	0.71J	1.3	31.4
		7/18/2005	<0.5	<0.5	ND	22.4	<1	<0.5	1.2	23.6
		10/7/2005	<0.5	0.57J	0.57J	20.1	<1	<0.5	1.8	21.9
0574	18–28	10/7/2004	35.4	330	330	58.9	<1	0.96J	0.81J	424.3
		1/11/2005	32.9	86.1	86.1	28.2	<1	0.76J	0.84J	147.2
		4/7/2005	15.4	39	39	13.8	<1	<0.5	<0.5	68.2
		7/18/2005	16.3	22.2	22.2	7.7	<1	<0.5	<0.5	46.2
		10/5/2005	2.9	13.5	13.5	6.7	<1	0.68J	<0.5	23.1
0575	5–15	10/11/2004	<0.5	4.4	6.3	35.9	<1	2.1	1.9	46.2
		1/11/2005	<0.5	5.4	7.1	34.9	<1	1.9	2.2	46.1
		4/15/2005	<0.5	2.8	3.9	15.1	<1	1.1	1.1	21.2
		7/18/2005	<0.5	<0.5	2.1	15.7	<1	1.4	1.2	20.4
		10/7/2005	<0.5	2.2	9.1	6.6	<1	2.2	1.5	19.4

Table 9 (continued). COPC Concentrations at the Northeast Site (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
0576	20–30	10/7/2004	<0.5	14.1	14.1	6.5	<1	0.63J	<0.5	20.6
		1/11/2005	<0.5	18.7	18.7	11.2	<1	0.95J	<0.5	29.9
		4/15/2005	<0.5	27.8	27.8	20.1	<1	0.68J	<0.5	47.9
		7/18/2005	1.1	46.8	46.8	63.1	<1	<0.5	<0.5	111
		10/5/2005	<0.5	5.5	5.5	3.2	<1	0.53J	<0.5	8.7
0577	5–15	10/7/2004	<5	<5	32	441	<10	6.3J	234	707
		1/12/2005	<2.5	14.5	38.2	276	<5	5.7	21.1	341
		4/15/2005	1.3	2.6	14.8	33	<1	4.1	6.6	59.8
		7/18/2005	<0.5	<0.5	11.6	4.9	<1	5.1	6.2	27.8
		10/5/2005	<0.5	<0.5	7.5	0.69J	<1	4.7	1.5	13.7
0578	20–30	10/11/2004	<0.5	10.2	12	25.2	<1	<0.5	0.91J	37.2
		1/12/2005	<0.5	8.3	8.3	7.9	<1	<0.5	<0.5	16.2
		4/15/2005	<0.5	4.6	4.6	2.9	<1	<0.5	<0.5	7.5
		7/18/2005	<0.5	1.1	1.1	1.7	<1	<0.5	<0.5	2.8
		10/10/2005	<0.5	2.5	2.5	1.8	<1	<0.5	<0.5	4.3
M03D	15–25	4/15/2005	<0.5	<0.5	ND	0.79J	<1	<0.5	<0.5	ND
M03S	2.5–12	1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12D	22.5–32.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12S	5–14.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M14D	18.5–28.5	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M14S	4–14	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M16D	18.5–28.5	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M16S	5–14.5	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M24D	20–30	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M27D	21–31	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M27S	6–16	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M29D	20–30	10/8/2004	<0.5	<0.5	ND	<0.5	1.2	<0.5	<0.5	1.2
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M29S	5–15	10/8/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M30D	20.5–30.5	10/8/2004	<25	500	500	2,120	<50	<25	<25	2,620
		1/12/2005	<0.5	578	579.7	2,020	<1	6.1	<0.5	2,605.8
		4/15/2005	<0.5	294	296	1,440	<1	4.4	<0.5	1,740.4
M30S	5.5–15.5	10/8/2004	<0.5	1.1	1.1	4.3	<1	<0.5	<0.5	5.4
		1/12/2005	<0.5	0.72J	0.72J	2.1	<1	<0.5	<0.5	2.1
		4/15/2005	<0.5	<0.5	ND	1.8	<1	<0.5	<0.5	1.8
M31D	19.5–29.5	10/8/2004	<0.5	<0.5	ND	3	1.4	19.8	2.8	27
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	24.5	2	26.5
		4/15/2005	<0.5	<0.5	ND	5.7	<1	17.3	1.6	24.6

Table 9 (continued). COPC Concentrations at the Northeast Site (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
M31S	4.5–14.5	10/8/2004	<0.5	<0.5	ND	0.99J	<1	<0.5	<0.5	ND
		1/13/2005	<0.5	<0.5	ND	4.2	<1	<0.5	<0.5	4.2
		4/15/2005	<0.5	<0.5	ND	1.7	<1	<0.5	<0.5	1.7
M32D	14–24	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M32S	3–13	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M33D	20–30	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
RW16	20–30	4/15/2005	<0.5	1.6	1.6	110	<1	2.5	<0.5	114.1
X11	–	4/11/2005	<50	443	443	3,610	<100	<50	149	4,202

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection limits.
[b]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[c]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE value is not part of the total COPC value because this value is included in the total 1,2-DCE value. "J" values are not included in the total COPC value.
ND = Not detected.
J = Estimated value, result is between the reporting limit and the method detection limit.
Arsenic, while a COPC, is not included in this table, nor in the Total COPC value.

Table 10. COPC Concentrations at the Building 100 Area
(reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
Industrial Drain Leaks Bldg 100 / Old Drum Storage Site									
PIN06									
0500	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
PIN09									
0500	3–13	4/12/2005	<0.5	0.52J	<0.5	0.52J	<0.5	<0.5	ND
PIN10									
0500	3–13	4/12/2005	<0.5	1.8	<0.5	1.8	<0.5	<0.5	1.8
PIN12									
0508	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0509	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0510	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0511	3–13	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	3–13	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0513	15–25	4/12/2005	<0.5	2.4	1.3	3.7	<0.5	6.1	9.8
0514	30–40	4/12/2005	<0.5	5.1	21.8	26.9	<0.5	24.5	51.4
		10/6/2005	<0.5	9.4	28.4	37.8	<0.5	35.6	73.4
0515	15–25	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0516	30–40	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0517	15–25	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0518	30–40	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	1.4	1.4
0520	36–46	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	19.5	19.5
0521	19.5–29.5	4/12/2005	1.5	1.6	<0.5	1.6	<0.5	<0.5	3.1
0522	32–42	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0523	18–28	4/12/2005	<0.5	0.66J	<0.5	0.66J	<0.5	0.57J	ND
0524	27–37	4/11/2005	356	3,390	<50	3,390	182	1,440	5,368
		10/10/2005	123	1,670	19.8	1,689.8	80.6	713	2,606.4
0525	12–22	4/9/2005	<0.5	2	<0.5	2	<0.5	<0.5	2
0526	19.5–29.5	4/11/2005	<0.5	1.5	0.58J	1.5	<0.5	1.1	2.6
		10/10/2005	<0.5	3.4	1.4	4.8	<0.5	0.69J	4.8
0527	118–137.9	4/14/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0528	127–146.9	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
RW01	19–29	10/5/2004	4,200	2,000	<50	2,000	<50	550	6,750
		1/6/2005	4,250	2,450	<50	2,450	<50	634	7,334
		4/5/2005	4,390	2,770	<50	2,770	<50	996	8,156
		7/6/2005	4,220	2,440	<50	2,440	<50	641	7,301
		10/4/2005	4,390	2,700	51.9J	2,700	<50	783	7,873
RW02	25–35	10/5/2004	349	590	48.9	638.9	16.8	66	1,070.7
		1/6/2005	432	670	55.4	725.4	17.3	58.4	1,233.1
		4/5/2005	298	556	42.6	598.6	13.6	89.4	999.6
		7/6/2005	264	470	34.9	504.9	12.7	55.6	837.2
		10/4/2005	398	562	51.3	613.3	22.1	88.5	1,121.9

Table 10 (continued). COPC Concentrations at the Building 100 Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
S29C	14–24	4/6/2005	<0.5	<0.5	3.3	3.3	<0.5	<0.5	3.3
S30B	5–15	4/6/2005	545	18,800	919	19,719	376	2,210	22,850
S31B	5–15	4/6/2005	<0.5	0.95J	<0.5	0.95J	<0.5	<0.5	ND
S32B	5.5–15.5	4/6/2005	<0.5	1.6	<0.5	1.6	<0.5	<0.5	1.6
S33C	11–21	4/6/2005	<5	74.1	18	92.1	<5	385	477.1
S35B	5–15	4/8/2005	23,800	67,600	8,210	75,810	211	15,000	114,821
		10/7/2005	11,600	33,700	5,010	38,710	146E	7,500	57,956
S36B	5–15	4/6/2005	<0.5	1.1	<0.5	1.1	<0.5	2.2	3.3
S37B	5–15	4/6/2005	<0.5	58.9	1.1	60	<0.5	80.8	140.8
S54D	36–41	4/8/2005	7,280	36,200	308	36,508	465	6,460	50,713
S55B	10–19.8	4/7/2005	7	1,030	13.1	1,043.1	4.8	6,690	7,744.9
S55C	20.5–30.3	4/7/2005	4.7	6,450	44.7	6,494.7	38.8	1,460	7,998.2
S56B	10–19.8	4/7/2005	1.9	74.1	0.99J	74.1	0.91J	46.3	122.3
S56C	20.5–30.3	4/7/2005	1.4	56.9	1.3	58.2	<0.5	39.8	99.4
S56D	31–40.8	4/7/2005	1.8	33.5	0.9J	33.5	0.64J	10.4	45.7
S57B	10–19.8	4/7/2005	<0.5	<0.5	0.74J	0.74J	<0.5	0.92J	ND
S57C	20.5–30.3	4/7/2005	820	5,950	39.1	5,989.1	207	6,030	13,046.1
S57D	31.5–41.3	4/7/2005	37.5	857	11.7	868.7	38.4	565	1,509.6
S59B	10–19.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S59C	20.5–30.3	4/7/2005	<0.5	7.9	<0.5	7.9	<0.5	8.2	16.1
S59D	31–40.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S60B	10–19.8	4/7/2005	<0.5	3.9	<0.5	3.9	0.86J	<0.5	3.9
S60C	20.5–30.3	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S60D	31–40.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S67B	10–19.83	4/12/2005	<5	25.1	<5	25.1	<5	572	597.1
S67C	20–29.83	4/12/2005	<10	616	88.2	704.2	<10	304	1,008.2
S67D	30–39.83	4/11/2005	<1	147	16	163	1.6J	126	289
S68B	10–20	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S68C	18–28	4/11/2005	<0.5	3.6	<0.5	3.6	<0.5	4.6	8.2
S68D	30–40	4/11/2005	<0.5	56.7	0.87J	56.7	<0.5	45.6	102.3
S69B	10–20	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69C	20–30	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69D	30–40	4/12/2005	<0.5	0.53J	<0.5	0.53J	<0.5	<0.5	ND
S70B	10–20	4/12/2005	<0.5	18.5	<0.5	18.5	<0.5	<0.5	18.5
S70C	20–30	4/12/2005	<0.5	18.1	4.7	22.8	0.59J	<0.5	22.8
S70D	30–40	4/12/2005	<0.5	11.3	4.1	15.4	0.51J	<0.5	15.4
S71B	10–20	4/13/2005	<0.5	0.58J	<0.5	0.58J	<0.5	<0.5	ND
S71C	20–30	4/13/2005	<0.5	53.2	26.8	80	1.2	59.3	140.5
S71D	30–40	4/13/2005	<0.5	5.2	1.6	6.8	<0.5	2.7	9.5
S72B	10–20	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S72C	20–30	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S72D	30–40	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S73B	10–20	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND

Table 10 (continued). COPC Concentrations at the Building 100 Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
S73C	20–30	4/13/2005	<0.5	2	5.1	7.1	<0.5	13	20.1
		10/7/2005	<0.5	1	3.6	4.6	<0.5	8.9	13.5
S73D	30–40	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
TE03	–	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	4.2	4.2
PIN21		**Perimeter Monitoring Wells**							
0500	7–17	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	20–28	4/13/2005	<0.5	1.5	<0.5	1.5	<0.5	<0.5	1.5
0502	7–17	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0503	20–28	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0504	7–17	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0505	20–28	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	20–29.5	4/12/2005	<0.5	1.7	<0.5	1.7	<0.5	<0.5	1.7

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection limits.
[b]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[c]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE and trans-1,2-DCE values are not part of the total COPC value because these values are included in the total 1,2-DCE value. "J" values are not included in the total COPC value.

ND = Not detected.
J = Estimated value, result is between the reporting limit and the method detection limit.
Arsenic, while a COPC, is not included in this table, nor in the Total COPC value.

Table 11. COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Arsenic	Total COPC[b]
FDEP MCL			**50**	
PIN18	**Wastewater Neutralization Area**			
0500	11–16	10/13/2004	63.4	63.4
		1/14/2005	60.1	60.1
		4/11/2005	44.1	44.1
		7/15/2005	52.4	52.4
		10/5/2005	52.3	52.3
0502	11–16	10/13/2004	10	10
		1/14/2005	38	38
		4/11/2005	16.9	16.9
		7/15/2005	35.6	35.6
		10/5/2005	33.7	33.7
0503	10–20	4/9/2005	<3.5	ND
0504	13–22	4/11/2005	<3.5	ND
0505	10.5–20.5	4/9/2005	<3.5	ND
0506	12–22	4/9/2005	<3.5	ND
0507	27–37	4/9/2005	<3.5	ND
0508	31–41	4/11/2005	<3.5	ND
0509	27.5–37.5	4/9/2005	<3.5	ND
0510	27.5–37.5	4/9/2005	<3.5	ND
0511	32–42	4/9/2005	<3.5	ND
0512	21–31	4/9/2005	<3.5	ND
0513	12–22	4/9/2005	<3.5	ND
0514	32.5–42.5	4/9/2005	<3.5	ND
0515	22.5–32.5	4/9/2005	<3.5	ND
0516	12.5–22	4/9/2005	<3.5	ND
0517	31.5–41.5	4/9/2005	<3.5	ND
0518	22.5–32.5	4/9/2005	<3.5	ND
0519	12.5–22.5	4/9/2005	<3.5	ND
0520	32.5–42.5	4/11/2005	<3.5	ND
0521	20–30	10/12/2004	<3.5	ND
		1/14/2005	<3.5	ND
		4/11/2005	<3.5	ND
		7/14/2005	<2.9	ND
		10/5/2005	<2.9	ND
0522	5–15	10/12/2004	8.2B	ND
		1/14/2005	11.5	11.5
		4/11/2005	5.5B	ND
		7/14/2005	15.4	15.4
		10/5/2005	13.7	13.7

Table 11 (continued). COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Arsenic	Total COPC[b]
FDEP MCL			**50**	
0523	32.5–42.5	10/12/2004	<3.5	ND
		1/14/2005	<3.5	ND
		4/11/2005	<3.5	ND
		7/14/2005	<2.9	ND
		10/5/2005	<2.9	ND
0524	20–30	10/12/2004	11.8	11.8
		1/14/2005	<3.5	ND
		4/11/2005	14.6	14.6
		7/14/2005	23.1	23.1
		10/5/2005	8.9B	ND
0525	5–15	10/12/2004	53.7	53.7
		1/14/2005	60.5	60.5
		4/11/2005	62.7	62.7
		7/14/2005	53.6	53.6
		10/5/2005	118	118
0526	19.5–29	4/9/2005	<3.5	ND
RW02	10–20	10/5/2004	64.3	64.3
		1/6/2005	34.6	34.6
		4/5/2005	50.9	50.9
		7/6/2005	33.5	33.5
		10/4/2005	46.6	46.6
RW03	9–24	10/5/2004	35.3	35.3
		1/6/2005	31.2	31.2
		4/5/2005	83.8	83.8
		7/6/2005	48.8	48.8
		10/4/2005	98.6	98.6
RW0501	11–16	10/5/2004	116	116
		1/6/2005	88.8	88.8
		4/5/2005	91.6	91.6
		7/6/2005	240	240
		10/4/2005	344	344

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection limits.
[b]Total COPC is the sum of the individual COPC concentrations. "J" values or "B"-qualified arsenic values are not included in the total COPC value.

ND = Not detected.
J = Estimated value for VOCs; result is between the reporting limit and the method detection limit.
B = Estimated value for inorganics; result is between the instrument detection limit and the reporting limit.

Table 12. Relative Percent Difference (RPD) for Duplicate Samples

Sample ID	Duplicate ID	Report Number	Anayte	S	D	Ratio	DL	5xDL	Fail
PIN06−0501	PIN24−0500	F35561	Arsenic	0.0168	0.0196	15.4	0.0029	0.0145	
PIN12−S32B	PIN24−0501	F35561	non-detect for Arsenic						
PIN12−S73C	PIN24−0502	F35561	cis-1,2-Dichloroethene	1	0.86	15.1	0.5	2.5	
			trans-1,2-Dichloroethene	3.6	3.6	0.0	0.5	2.5	
			Vinyl chloride	8.9	8.8	1.1	0.5	2.5	
PIN15−0573	PIN24−0503	F35608	Benzene	0.25	0.59	81.0	0.5	2.5	
			cis-1,2-Dichloroethene	0.57	0.62	8.4	0.5	2.5	
			Toluene	1.8	1.7	5.7	0.5	2.5	
			trans-1,2-Dichloroethene	0.25	0.58	79.5	0.5	2.5	
			Vinyl chloride	20.1	21.4	6.3	0.5	2.5	
PIN15−0578	PIN24−0504	F35608	cis-1,2-Dichloroethene	2.5	2.5	0.0	0.5	2.5	
			Vinyl chloride	1.8	2	10.5	0.5	2.5	
PIN15−M03S	PIN24−0505	F35561	non-detect for Arsenic						

[a]S = Original sample (N001), VOC concentrations in µg/L and metals in mg/L.
[b]D = Duplicate sample (N002), VOC concentrations in µg/L and metals in mg/L.
[c]RL = Reporting limit.
[d]Fail = Volatiles "Fail" when the RPD is greater than ± 30% and the concentration is more than 5 times the reporting limit. Metals "Fail" when the samples are more than 5 times the reporting limit and the RPD is greater than 20%. For metals samples that are less than 5 times the reporting limit the difference must be less than ± the reporting limit (this includes the case when only one of the duplicate/sample values is less than 5 times the reporting limit).

Table 13. Summary of Analytical Results for the Building 100 Area Treatment System (reported in micrograms per liter unless otherwise noted)[a]

Location[b]	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[c]	1,1-DCE	Vinyl chloride	Total COPC[d]	$CaCO_3$ mg/L	Fe mg/L
PIN12	**Industrial Drain Leaks Bldg. 100**									
TRTI	10/4/2005	902	1,150	38.6	1,188.6	20	142	2,252.6	351	4.8
	11/3/2005	978	1,150	25.6	1,175.6	12.7J	124	2,277.6	375	4.87
	12/5/2005	1,460	1,770	49.5J	1,770	<25	253	3,483	371	4.89
TRTE	10/4/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND	356	4.88
	11/3/2005	0.71J	2.4	<0.5	2.4	<0.5	<0.5	2.4	377	4.9
	12/5/2005	<0.5	1.9	<0.5	1.9	<0.5	<0.5	1.9	366	4.87

[a]"<" values are method detection limits.
[b]TRTI is the system influent and TRTE is the system effluent.
[c]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[d]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE and trans-1,2-DCE values are not part of the total COPC value because this value is included in the total 1,2-DCE value. "J" values are not included in the total COPC value.

J = Estimated value, result is between the reporting limit and the method detection limit.
ND Not detected.

Table 14. Summary of Historical Ground Water Recovery from the Building 100 Recovery Wells

Report Date	Quarterly (gallons)	Cumulative Total To Date (gallons)
April−June 2004	188,490	188,490
July−September 2004	410,734	599,224
October−December 2004	589,242	1,188,466
January−March 2005	470,708	1,659,174
April−June 2005	490,041	2,149,215
July−September 2005	498,292	2,647,507
October−December 2005	471,778	3,119,285

Note: The Building 100 Ground Water Treatment System started operations in May 2004.

Table 15. Estimated Mass of VOCs Recovered from the Building 100 Recovery Wells During October, November, and December 2005

Month	Volume Treated (gallons)	Concentration[a]						
		cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Toluene (µg/L)	TCE (µg/L)	Methylene Chloride (µg/L)	Vinyl Chloride (µg/L)	Total VOCs (µg/L)
October 2005	150,639	1,150	38.6	0.25	902	0.5	142	2,233
November 2005	162,089	1,150	25.6	5.00	978	10.0	124	2,293
December 2005	159,050	1,770	49.5	12.50	1,460	25.0	253	3,570

Month	Volume Treated (gallons)	Mass Recovered[b]						
		cis-1,2-DCE (lbs)	trans-1,2-DCE (lbs)	Toluene (lbs)	TCE (lbs)	Methylene Chloride (lbs)	Vinyl Chloride (lbs)	Total VOCs (lbs)
October 2005	150,639	1.45	0.05	0.00	1.13	0.00	0.18	2.81
November 2005	162,089	1.56	0.03	0.01	1.32	0.01	0.17	3.10
December 2005	159,050	2.35	0.07	0.02	1.94	0.03	0.34	4.74

[a]These concentrations represent the average of monthly sampling results.
[b]Includes "J" (estimated) values. For any detection of "<", which indicates the laboratory could not detect that analyte, 50 percent of the "<" value was used for the calculation of recovery.


West Pond
East Pond
Southwest Pond
South Pond
M025 12.92
M024 14.23
0503 13.60
M012 14.55
0500 14.50
M035 12.87
M40S 13.49
M003 13.94
M14S 13.87
M12S 13.25
0563 12.83
0565 12.62
0577 11.70
0575 12.14
0523 13.54
0573 11.80
M27S 12.86
0567 12.24
0561 11.81
0530 11.70
0579 10.71
M03S 12.59
0520 13.45
0515 10.75
M30S 11.43
M29S 10.98
M16S 12.04
M31S 9.47
0583 11.05
M32S 11.72
E001 13.47
0507 13.36
0571 13.54
0510 13.57
10-0500 13.75
0512 14.06
0523 12.50
RW01 2.74
0521 13.00
0504 13.85
0526 13.80
0500 12.27
RW0501 9.01
RW02 8.70
0524 13.08
RW03 8.01
0521 12.28
S35B 13.58
S55C 13.97
21-0501 12.88
S57C 13.91
S59C 13.84
S67C 13.69
S67B 13.66
TE03 13.61
S72C 12.80
S72B 12.77
S60C 13.63
S71C 13.17
S71B 13.25
0515 13.61
0518 13.56
0513 13.29
0512 13.50
S70C 13.21
S70B 13.21
0526 12.88
S73B 12.81
0517 13.82
0525 13.35
S68C 13.23
S68B 13.49
S69C 12.84
S69B 12.85
SW01 13.12
S001 13.05
21-0505 13.11
21-0503 12.18
21-0512 12.81
N
100 0 100 Feet
S55C 13.97 Well Number and Ground Water Elevation in Feet (MSL)
Monitoring Well
Recovery Well
Surface Sample
Building
Fence
Pond
Road
Slurry Wall
Railroad
14 Water Table Contour in Feet (MSL)
18 Inferred Water Table Contour in Feet (MSL)
Contour Interval = 1.0 Feet
Inferred Ground Water Flow Direction

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Prepared by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AC01-02GJ79491

Plate 1: Sitewide Shallow Surficial Aquifer Contours
Pinellas, Florida, October 2005

DATE PREPARED: January 30, 2006
FILENAME: N0087600-08

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Prepared by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AC01-02GJ79491

Plate 2: Sitewide Deep Surficial Aquifer Contours
Pinellas, Florida, October 2005

DATE PREPARED: January 30, 2006

FILENAME: N0087600-07

Appendix A

Laboratory Reports—October 2005 Quarterly Results

Click here to view technical report F35489
Click here to view technical report F35491
Click here to view technical report F35492
Click here to view technical report F35561
Click here to view technical report F35608
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Appendix B

Laboratory Reports for
Building 100 Treatment System—October through December 2005

Click here to view technical report F35493
Click here to view technical report F36369
Click here to view technical report F36371
Click here to view technical report F37074
Click here to view technical report F37075

Appendix C

Laboratory Reports for WWNA—October through December 2005

Click here to view technical report F36361
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